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Crabtree Creek, Wake County, North Carolina Interceptor Sewer

Environmental Protection Agency

Prepared for

North Carolina Dept. of Natural and Economic Resources, Raleigh

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Final Environmental Impact Statement on the awarding of grant funds to Wake County, North Carolina for the preparation of plans and specifications for the construction of an interceptor line to service the upper drainage basin of Crabtree Creek. The project consists of approximately 92,000 linear feet of pipe sized from 48" to 12", 12,600 linear feet of 20" force main, and one pumping station. The document, presents environmental impacts of the project as well as alternatives considered. Response is made to all comments and questions made at the Public Hearing on the Draft and to all letters received from Federal, State, and local agencies and private individuals.

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FINAL
ENVIRONMENTAL IMPACT STATEMENT

CRABTREE CREEK, WAKE COUNTY, NORTH CAROLINA

INTERCEPTOR SEWER

EPA PROJECT C 370344

PREPARED BY
U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV
ATLANTA, GEORGIA 30309

IN COOPERATION WITH
THE STATE OF NORTH CAROLINA
DEPARTMENT OF NATURAL AND ECONOMIC RESOURCES

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

FINAL

ENVIRONMENTAL IMPACT STATEMENT

CRABTREE CREEK, WAKE COUNTY, NORTH CAROLINA

INTERCEPTOR SEWER

EPA PROJECT C370344

Prepared By
Environmental Protection Agency
Region IV
Atlanta, Georgia 30309

In cooperation with
The State of North Carolina
Department of Natural and Economic Resources

Approved by

Jack E Ravan 6/18/76
Regional Administrator Date

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SUMMARY SHEET FOR ENVIRONMENTAL IMPACT STATEMENT

CRABTREE CREEK, WAKE COUNTY, NORTH CAROLINA

Draft ( )

Final (X)

Environmental Protection Agency
Region IV
1421 Peachtree Street, N. E.
Atlanta, Georgia 30309

1. Administrative Action (X)

Legislative Action ( )

2. The subject action of this Environmental Impact Statement is the awarding of grant funds for the construction of an interceptor sewer line in Wake County, North Carolina to service the upper drainage basin of Crabtree Creek. The present EPA grant offer is $2,445,750 of a total estimated project cost of $5,300,000 for approximately 92,000 linear feet of pipe sized from 48" to 12", 12,600 linear feet of 20" force main, and one pumping station.

3. The major impacts of the project are divided into the following: a) beneficial, b) growth and development, c) primary adverse and d) secondary adverse impacts. The main beneficial impact of the project is the establishment of a

regional wastewater collection system providing for (1) the elimination of present and possible future wastewater discharges to Crabtree Creek and its tributaries, (2) discontinuance of use of septic tanks in the unsuitable soils in the Upper Crabtree Basin, and (3) factors other than wastewater disposal to be the developmental constraints in this basin.

The major growth and development impact will be the stimulation of the rate of development and the allowance of increased densities in the project service area.

The major primary and secondary adverse impacts are listed below followed by mitigative factors and recommended control measures.

A. Primary

a. Construction Erosion and Sedimentation

Sewer line construction adjacent to a waterway presents a potential for significant amounts of soil erosion from excavation and surface traffic. In order to lessen this potential impact, Wake County shall provide to EPA and the North Carolina Sedimentation Control Commission for approval an erosion and sedimentation control plan which indicates those specifications to be included in the construction contract for the proposed project. As a minimum, control measures shall comply with the North Carolina and Wake County erosion and sedimentation control requirements and whenever possible provide a 10 meter (33 feet) buffer between the creek bank and the edge of the construction right-of-way.

b. Archeological and Historical

A surface survey along the construction right-of-way revealed three potentially significant archeological sites (Appendix 14). The applicant will work with the North Carolina State Archeologist before project construction to insure that no irreparable damage will be done to significant cultural resources.

c. Odors

Since the proposed project is approximately 10 miles long and ties in with an interceptor that is also about 10 miles long, there is a possibility that the wastewater may become anaerobic and produce offensive odors. To alleviate this potential impact, the design of the lift station will include facilities for aeration of the wastewater.

d. Alteration of Ecosystems

The proposed project will clear a 12.5 meter (40 ft.) right-of-way. Preservation of certain unique vegetative communities is desirable for use in the proposed greenway system and for other recreational and aesthetic uses. A vegetative survey was conducted to identify unique areas (Appendix 15). Route realignment will be considered in those areas identified as specified in Section 6 of Chapter V.

B. Secondary

a. Flooding

Development of the Upper Crabtree Creek Basin associated with the proposed project will increase the probability of damages from flooding in downstream areas. The completion of the SCS flood control project is one method of mitigating this adverse impact. Grant funds shall be withheld from the proposed project until all land rights have been acquired for Soil Conservation Service Control Structures located within each proposed service area, or until other structural and non-structural measures are taken, including, but not limited to, channel improvement, flood proofing, urban runoff controls, developmental restrictions, and other land use modifications which will insure an equivalent amount of flood protection as determined by the State of North Carolina, the SCS, the COE, and the EPA.

b. Developmental Erosion and Sedimentation

Development of the Upper Crabtree Basin will significantly increase the amount of sediment reaching Crabtree Creek. Wake County has enacted the Wake County Erosion and Sedimentation Control Ordinance in order to reduce this potential impact.

c. Demand for Community Services

The project will allow an increase in the rate and density of growth in the service area. Associated with this growth is the need for water supply, transportation, power, schools, open space and recreational facilities, shopping areas, fire and police protection, health facilities, and garbage pickup. In order to adequately supply these services, a comprehensive program of land use and community services planning should be initiated.

4. The alternatives considered were the "no action" alternative and possible alternative routing systems to satisfy the wastewater collection needs of the upper Crabtree Creek basin. A routing along Walnut Creek to the Neuse River Sewage Treatment Plant and a system discharging to the New Hope Basin are evaluated. Reducing the scope of the project is also considered.

The proposed project is considered the most appropriate course of action following provisions of flood protection.

For purposes of this EIS, EPA, Region IV, Atlanta, Georgia is the "responsible Federal agency" as required by NEPA.

5. The following Federal, State, and local agencies and interested groups have submitted written comments on the draft impact statement. These comments are included as Appendix 12.

Forest Service, U. S. Department of Agriculture
Soil Conservation Service, U. S. Department of Agriculture
U. S. Army Corps of Engineers
Federal Power Commission
U. S. Coast Guard, U. S. Department of Transportation
U. S. Department of the Interior
U. S. Department of Housing and Urban Development
Federal Highway Administration, U. S. Department of Transportation
North Carolina Department of Cultural Resources
North Carolina Department of Natural and Economic Resources
North Carolina Department of Agriculture
Wake County Department of Natural Resources

Wake Soil and Water Conservation District

Triangle J. Council of Governments

Water Resources Institute, University of North Carolina

City of Raleigh, North Carolina

League of Women Voters of Raleigh-Wake County

Oak Park - Glen Forest - Deblyn Park Civic Association

Sierra Club, Joseph LeConte Chapter

Crabtree Creek Citizens Assistance Committee

Mr. Robert E. Giles, Private Citizen

Mr. Russell C. Walton, Jr., Private Citizen

Mr. James L. Briley, Private Citizen

Dr. Terry S. Dunn and Dr. William L. Dunn, Private Citizens

Ms. Lucille Grissom, Private Citizen

Ms. Mary H. Chappell, Private Citizen

Mr. Rex Gary Schmidt, Private Citizen

Mr. Lloyd M. Hedgepeth, Private Citizen

Mrs. Ben L. Clifton, Private Citizen

Mr. Irvin B. Tucker, Jr., Private Citizen

Mr. David F. Portet, Private Citizen

Mr. and Mrs. Robert Butler, Private Citizens

Mr. Russell Lee Walton, Private Citizen

Mr. Charles Patta, Private Citizen

Mr. Bill White, Private Citizen
Mr. D. E. Herdren, Private Citizen
Ms. Martha Walton, Private Citizen
Ms. Margie G. Walton, Private Citizen
Ms. Mary Walton, Private Citizen
Mr. Thomas G. Crews, Jr., Private Citizen
Mr. James C. Johnson, Private Citizen
Mr. Russell Walk, Jr., Private Citizen
Mr. Joe A. Marlin, Private Citizen
Mr. John W. Cromwell, Jr., Private Citizen

6. The Draft of this Statement was made available to the Council on Environmental Quality and the Public on January 31, 1975. A public hearing was held on March 13, 1975, a transcript of which is included as Appendix 11. Copies of this Final Environmental Impact Statement were delivered to the Council and made available to the Public on July 15, 1976.

DRAFT ENVIRONMENTAL IMPACT STATEMENT

CRABTREE CREEK, WAKE COUNTY, NORTH CAROLINA
INTERCEPTOR SEWER
EPA PROJECT C370344

I. GENERAL DESCRIPTIVE INFORMATION

The Administrator of the Environmental Protection Agency, through Title II of the Federal Water Pollution Control Act (PL 92-500), is authorized to make grants to any State, municipality or intermunicipal or interstate agency for the construction of publicly-owned treatment works. The Federal share of construction costs shall be 75 percent of the total eligible costs. Each applicant for a grant shall submit plans, specifications, and cost estimates for approval, and must show that such works are in conformance with applicable areawide or State plans. Further, the proposed works must be certified by the appropriate State water pollution control agency as entitled to priority over other works in the State, and that the size and capacity of such works, relate directly to the needs to be served by such works, including sufficient reserve capacity.

Wake County, in response to present and future anticipated water quality problems, has requested funds for the construction of an interceptor sewer line to service the

Upper Crabtree Watershed area. At present, nine existing wastewater treatment plants discharge to Crabtree Creek or its tributaries; the Brier Creek Plant, Mobile City Plant, Cary's Coles Branch Plant, three plants in the little Brier Creek Basin, two plants on Sycamore Creek, and one facility serving a quarry on Crabtree Creek. Septic tank malfunctions and applications for site approvals for additional treatment facilities in this basin further indicate the need for a comprehensive program for wastewater transmission and treatment.

A. Project History

The Environmental Protection Agency (EPA) received an application on June 30, 1971 for grant funds for the construction of an interceptor sewer to serve Morrisville, a mobile home park, a portion of Cary, and future service areas west of Raleigh, North Carolina. An environmental impact appraisal was made from information supplied by the applicant, Wake County, North Carolina, and a negative declaration was published on December 12, 1972. On December 29, 1972 EPA offered Wake County $2,445,750, which was 75 percent of the total eligible project costs. This grant offer was formally accepted by the Wake County Commissioners.

Following the grant announcement, concerned persons contacted EPA, the Council on Environmental Quality (CEQ), and the North Carolina Department of Natural and Economic Resources. Ms. Anne Taylor, Conservation Chairman of the Research Triangle Group, Sierra Club, and Mr. Floyd Hedgepeth and Mr. Robert E. Giles, representing the Oak Park-Glen Forest-Deblyn Park Civic Association, expressed concern about flooding, sediment control, floodplain regulation, and area planning (Chapter II.E and Appendix 1). The CEQ also forwarded additional information that had been brought to its attention by the League of Women Voters, Wake Environment, and the Sierra Club.

After review of the new information, and consultation with the State of North Carolina Department of Natural and Economic Resources, agreement was made to prepare a joint Federal-State environmental impact statement, and a notice of intent was released on September 2, 1973. (Appendix 2)

B. Project Description

The EPA project 370344, Crabtree Creek, Wake County, North Carolina, includes interceptor sewer lines, a force main, and a pumping station. (Figure 1). Table 1 gives projected costs, available funds and desired additional funds.

Table 1

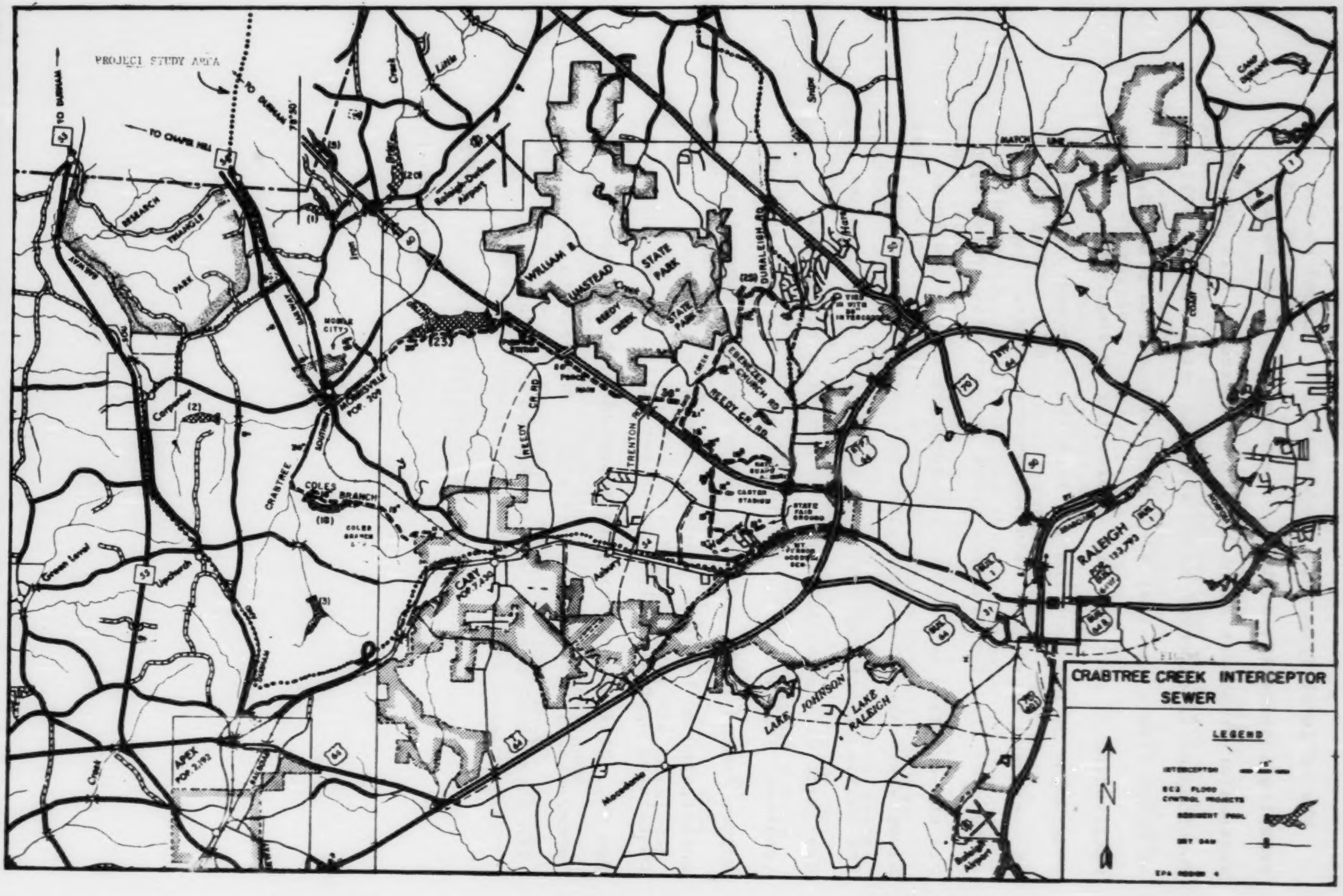
Project Costs Table (August 24, 1973)

Project Summary	
Land & Rights-of-way	$ 300,000
Construction	4,195,386
A/E Services	300,000
Legal & Fiscal	76,000
Administrative	10,000
Project Contingency	418,614
TOTAL PROJECT COST	$5,300,000

Available Funds	
EPA Grant Offer* (75%)	$2,445,750
State Supplemental Grant* (12.5%)	407,625
Acreage Fees (Advance)	450,000
Additional To Be Requested (EPA)	1,203,140
Additional To Be Requested (N.C.)	192,375
County of Wake	320,000
Town of Cary	180,000
TOTAL AVAILABLE FUNDS	$5,300,000

* EPA ruled $3,261,000 as eligible costs in their grant offer of 12-29-72.

NOTE: Revised cost estimates by Wake Engineering Study Group



CRABTREE CREEK INTERCEPTOR SEWER

The effluent from this project will be routed to the existing interceptor at the old non-operating Oak Park Wastewater Treatment Plant on Crabtree Creek. This 30-inch interceptor is expected to be adequate until 1985 or 1990, at which time a parallel 42-inch interceptor is planned. Paralleling of part of this interceptor is required regardless of the contribution from the proposed project due to increased flows from existing service areas. The wastewater from the Crabtree Creek project will be conveyed via the existing and future interceptors to the new Neuse River Wastewater Treatment Plant now under construction. The initial plant capacity will be 30 million gallons per day (mgd) with secondary extended aeration biological treatment followed by sand filtration. Average biological oxygen demand (BOD) and suspended solids (SS) removal are anticipated to be 97-98 percent, giving an effluent containing approximately 6 parts per million (ppm) BOD and 5 ppm SS. Ultimate capacity is expected to be 100 mgd by incremental increases in plant size. The impacts associated with this plant are not within the scope of this EIS.

1. Proposed Project Facilities

For discussion, the proposed project facilities are separated into four segments; Oak Park to Richland Creek, Richland Creek, force main and pumping station, and I-40 to Cary's wastewater treatment plant (See Figure 1).

a. Oak Park to Richland Creek

The proposed 48-inch interceptor sewer ties in with the existing system at the old Oak Park Wastewater Treatment Plant located off Oak Park Road on the north edge of Crabtree Creek. The line then follows a westerly course through the backyards of property owners on a 40-foot right-of-way. The interceptor is to be placed at an average depth of ten feet except at station 10+00, where drainage for an existing ditch must be provided. The interceptor crosses Crabtree Creek at station 25+38.65, approximately 850 feet south of Duraleigh Road, and then passes under the Duraleigh Road bridge.

The interceptor must then pass the Nello Teer Rock Quarry, near two settling ponds situated close to the creek.

The interceptor crosses Crabtree Creek at station 45+57 and back at 52+82. It then proceeds upstream to where it follows Richland Creek.

b. Richland Creek

From the confluence with Crabtree Creek a 42-inch interceptor crosses under Richland Creek and follows the west bank. It crosses Ebenezer Church Road and Reedy Creek Road. In these areas occasional steep slopes may necessitate placement close to the bank. On the southwest side of Reedy Creek Road the interceptor splits to a 36-inch main and a 21-inch main. The 36-inch main connects to the 20-inch force main around Umstead State Park, and the 21-inch main serves the Upper Richland Creek Basin.

c. Force Main and Pumping Station

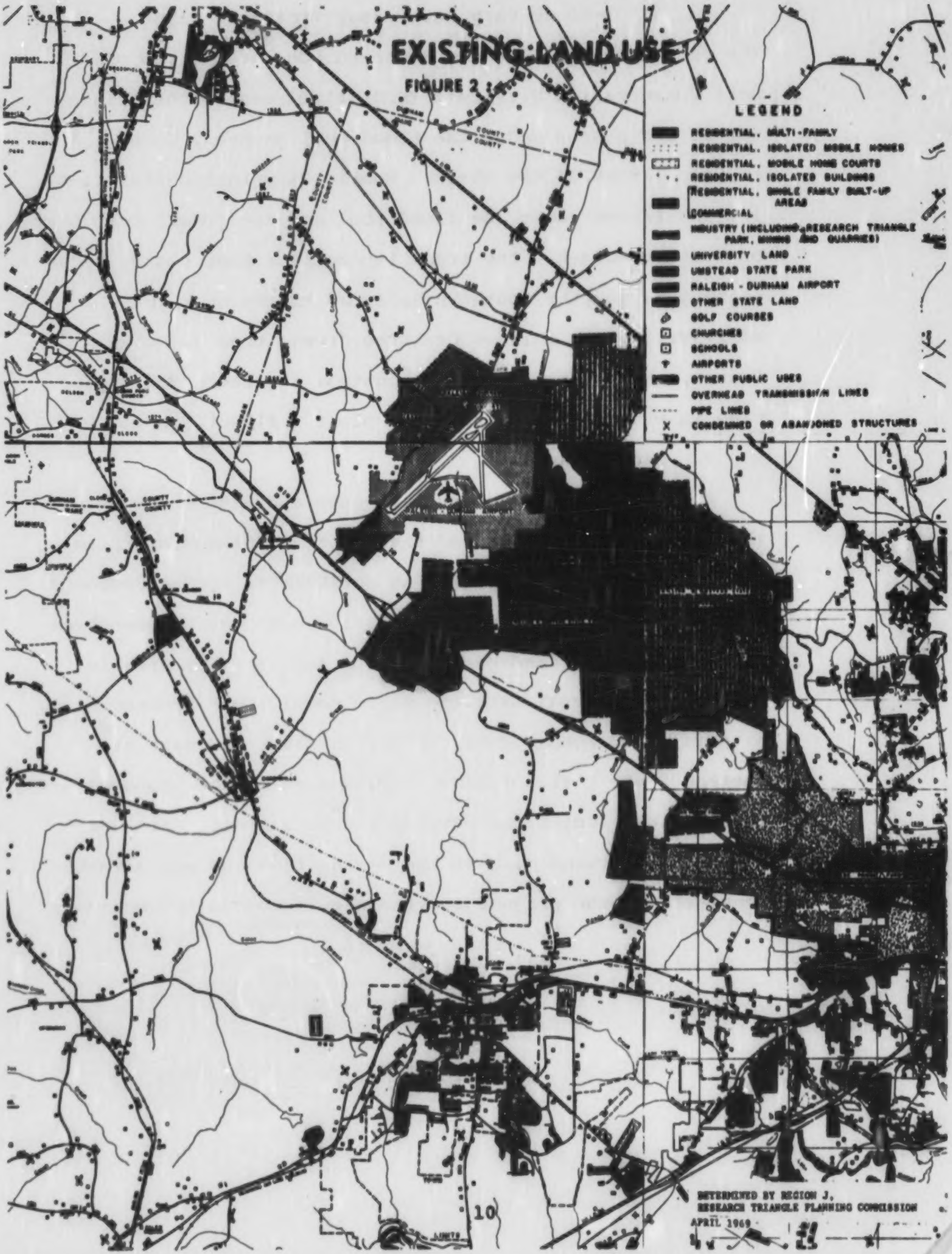
The 20-inch force main connects to the 36-inch interceptor line at Trenton Road, passes under I-40, and roughly follows Interstate 40 northwest to the pumping station located slightly southwest of I-40 on Crabtree Creek. This pumping station will have three pumps initially with future plans for a fourth. Two 750 gallons per minute (gpm) and one 2000 gpm pumps are planned, operating on power supplied by three 150 horsepower (hp) electric motors with a standby generator. Initial capacity would be 2000 gpm (2.88 mgd). Ultimate capacity is projected to be 12,000 gpm (17.3 mgd).

d. I-40 to Cary Wastewater Treatment Plant

The sewer then follows the southern edge of the proposed Soil Conservation Service's (SCS) flood control structure No. 23 and passes under the flood pool on Reedy Creek. At station 178+66.21 the 15-inch Mobile City interceptor ties in, and passes under the flood pool and up a small tributary of Crabtree Creek. The trunk interceptor then passes under Highway 54 and the Southern Railroad tracks near Morrisville. It follows Crabtree Creek, then up Coles Branch, skirts around the SCS control structure No. 18 and ties in with the Cary treatment plant influent line.

2. Service Areas

Figure 2 gives existing land uses and Figure 3 presents the proposed open space and the adopted thoroughfare plans for the project service area as established by the Region J Research Triangle Planning Commission. As may be seen from Fig. 2, existing land use in the project service area is predominantly rural with the major development located along arterial roadways in Cary, in Morrisville, and east of Umstead State Park. Following placement of the proposed interceptor, additional development is anticipated. The following sections discuss the design flow and approximate densities of the project service areas divided by secondary

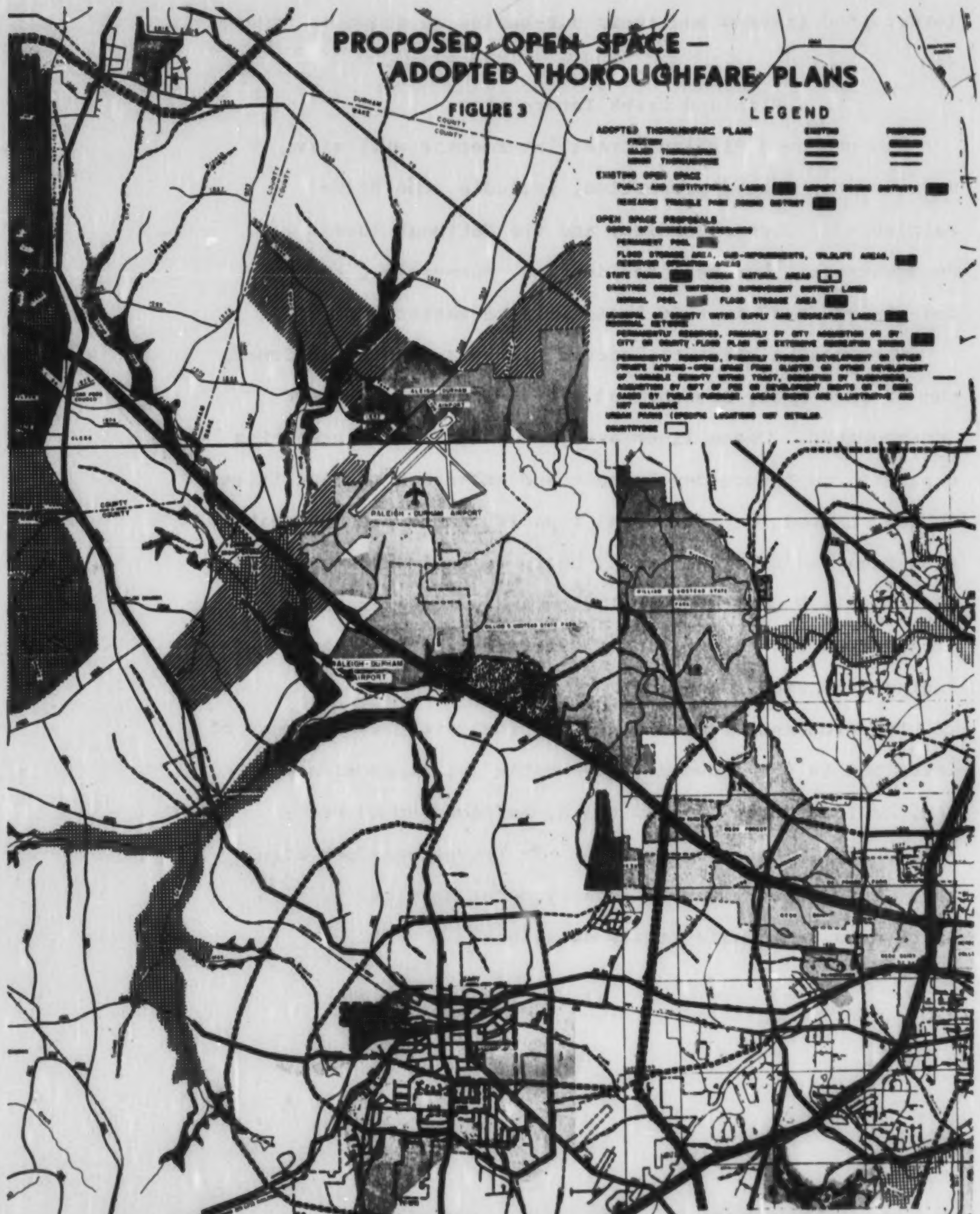


EXISTING LAND USE

FIGURE 2

LEGEND
RESIDENTIAL, MULTI-FAMILY
RESIDENTIAL, ISOLATED MOBILE HOMES
RESIDENTIAL, MOBILE HOME COURTS
RESIDENTIAL, ISOLATED BUILDINGS
RESIDENTIAL, SINGLE FAMILY BUILT-UP AREAS
COMMERCIAL
INDUSTRY (INCLUDING RESEARCH TRIANGLE PARK, MINING AND QUARRIES)
UNIVERSITY LAND
UMSTEAD STATE PARK
RALEIGH - DURHAM AIRPORT
OTHER STATE LAND
GOLF COURSES
CHURCHES
SCHOOLS
AIRPORTS
OTHER PUBLIC USES
OVERHEAD TRANSMISSION LINES
PIPE LINES
X CONDEMNED OR ABANDONED STRUCTURES

DETERMINED BY REGION J,
RESEARCH TRIANGLE PLANNING COMMISSION
APRIL 1969



LEGEND
ADOPTED THOROUGHFARE PLANS EXISTING PROPOSED
FREEWAY
MAJOR THOROUGHFARE
MINOR THOROUGHFARE
EXISTING OPEN SPACE
PUBLIC AND INSTITUTIONAL LANDS
AIRPORT ZONING DISTRICTS
RESEARCH TRIANGLE PARK ZONING DISTRICT
OPEN SPACE PROPOSALS
CORPS OF ENGINEERS RESERVOIRS
PERMANENT POOL
FLOOD STORAGE AREA, SUB-IMPOUNDMENTS, WILDLIFE AREAS, RESERVOIR OPERATION AREAS
STATE PARKS
URBAN NATURAL AREAS
CRABTREE CREEK WATERSHED IMPROVEMENT DISTRICT LANDS
NORMAL POOL
FLOOD STORAGE AREA
MUNICIPAL OR COUNTY WATER SUPPLY AND RECREATION LANDS
REGIONAL NETWORK
PERMANENTLY RESERVED, PRIMARILY BY CITY ACQUISITION OR BY CITY OR COUNTY FLOOD PLAIN OR EXTENSIVE RECREATION ZONING
PERMANENTLY RESERVED, PRIMARILY THROUGH DEVELOPMENT OR OTHER PRIVATE ACTIONS—OPEN SPACE FROM CLUSTER OR OTHER DEVELOPMENT OF VARIABLE DENSITY WITHIN TRACT, DEDICATION OF EASEMENTS, ACQUISITION BY GIFT OF FEE OR DEVELOPMENT RIGHTS OR IN SOME CASES BY PUBLIC PURCHASE. AREAS SHOWN ARE ILLUSTRATIVE AND NOT INCLUSIVE
URBAN PARKS (SPECIFIC LOCATIONS NOT DETAILED)
COUNTRYSIDE
DURHAM COUNTY
WAKE COUNTY
RALEIGH-DURHAM AIRPORT
WILLIAM B. UMSTEAD STATE PARK
CARY
11

PROPOSED OPEN SPACE — ADOPTED THOROUGHFARE PLANS

FIGURE 3

DEVELOPED BY REGION J.
RESEARCH TRIANGLE PLANNING COMMISSION
APRIL 1969

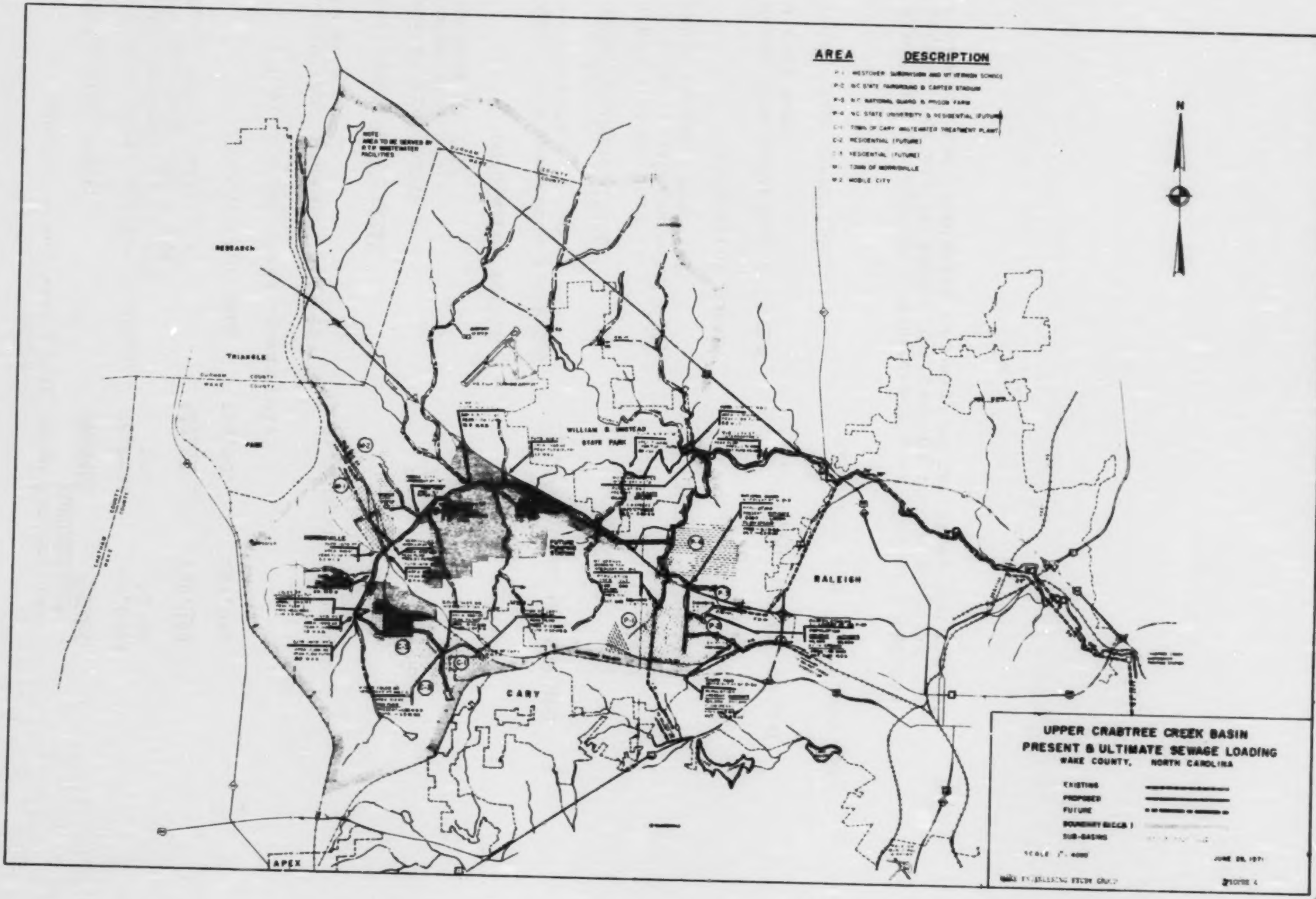
interceptor tie-ins and their sub-basins as shown on Figure 4.

a. Richland Creek Interceptor

The proposed Richland Creek interceptor will serve various State-owned properties, including the State Fairgrounds, Carter Stadium, and the National Guard Headquarters. Further, residential, commercial, and industrial needs in this basin will be satisfied.

The area is presently served by the 8-inch House Creek, the 12-inch Rocky Branch, and the 24-inch Walnut Creek interceptors. These lines are presently at or approaching capacity and future development and expansion of facilities suggest a need for additional capacity. The present peak flow from the Richland Creek Basin is estimated to be 1.9 mgd. Table 2 outlines population and wastewater usage projections for this basin as determined by the Wake Engineering Study Group.

The Richland Creek basin is approximately 4500 acres, of which 50% is state owned. (See table 2). Approximately 30%, or 1350 acres of this basin, is proposed to be residential with 14,000 persons, or ten persons per acre net. This density would probably occur as a mix of apartments and single family dwellings.


AREA DESCRIPTION
P-1 WESTOVER SUBDIVISION AND MT VERNON SCHOOL
P-2 N.C. STATE FAIRGROUND & CARTER STADIUM
P-3 N.C. NATIONAL GUARD & PRISON FARM
P-4 N.C. STATE UNIVERSITY & RESIDENTIAL (FUTURE)
C-1 TOWN OF CARY WASTEWATER TREATMENT PLANT
C-2 RESIDENTIAL (FUTURE)
C-3 RESIDENTIAL (FUTURE)
M-1 TOWN OF MORRISVILLE
M-2 MOBILE CITY
N
NOTE AREA TO BE SERVED BY RTP WASTEWATER FACILITIES
RESEARCH
TRIANGLE
PARK
DURHAM COUNTY
WAKE COUNTY
CHATHAM COUNTY
WAKE COUNTY
WILLIAM B. UMSTEAD STATE PARK
MORRISVILLE
RALEIGH
CARY
APEX
EXISTING
PROPOSED
FUTURE
BOUNDARY U.C.C.B. I
SUB-BASINS

UPPER CRABTREE CREEK BASIN
PRESENT & ULTIMATE SEWAGE LOADING
WAKE COUNTY, NORTH CAROLINA

SCALE 1" = 4000'

JUNE 28, 1971

WAKE ENGINEERING STUDY GROUP

FIGURE 4

Table 2
Population and Wastewater Usage Projections

	POPULATION*	
STATE OWNED (50%)	PRESENT	FUTURE
N.C.S.U. (35%) (Carter Stadium)	48,000±	80,000±
N.C. National Guard (5%)	500	1,000
Umstead State Park (5%)		
State Fairgrounds (5%)	120,000	200,000
POPULATION TOTALS	168,500	281,000
*These are temporary crowds only		
Waste Flow generated @ 10 gpd @Peak Rate	1,685,000gpd	2,810,000
PRIVATELY OWNED (40%)		
Residential (30%)	700±	14,000
Commercial (9%)	200±	1,400
Industrial (1%)	50±	350
POPULATION TOTALS	950±	15,750
Waste Flow generated @ 250 gpd @ Peak Rate	237,500 gpd	3,937,000 gpd
PUBLICLY OWNED (10%)		
Schools (less than 1%)	100	800
R/W, Etc., (Approximately 7%)	-	-
Other Public Owned (2%)	140	800
POPULATION TOTALS	240	1600±
Waste Flow generated @ 20 gpd @ Peak Rate	4,500 gpd	32,000 gpd
TOTAL FLOW GENERATED	1,927,000 gpd	6,779,000 gpd

* For design purposes, an ultimate peak flow of 5,000,000 gallons per day is used. The reasons for this are as follows: the complexity of usage of the area, the time of

peak crowds at sporting events and the State Fair, and the large percentage of this area is State ownership.

b. Mobile City Interceptor

This interceptor will serve the Mobile City Mobile Home Park located northeast of Morrisville. The line will eliminate the Mobile City 21,000 gpd extended aeration treatment plant discharging into an unnamed tributary of Crabtree Creek. This tributary has an average discharge of 0.8 cubic feet per second (cfs) and a 7-day, 10-year minimum flow of 0 cfs. At certain times the flow from the wastewater treatment plant is the entire flow of this tributary.

The plant is presently discharging an effluent with a 5-day BOD of 10 milligrams per liter (mg/l) and a suspended solids concentration of 9 mg/l. The average flow is estimated to be 16,000 gpd, serving approximately 100 trailers. Inspections on August 16 and 29, 1972 by the State Office of Water and Air Resources show DO in the stream to be less than 4 ppm (Appendix 3). This water quality violation can be directly related to the Mobile City treatment plant.

The owner of Mobile City has applied for a permit to construct additions to this plant raising its capacity to

0.5 mgd. Future peak loading on the proposed interceptor is projected to be 1.8 mgd (Figure 4).

c. Morrisville Interceptor

Approximately 200 residents of the city of Morrisville are served by septic tanks and drainfields. Due to the low permeability of the soils in the area, several drainfields have failed. Large lots are required by the County Public Health Department to help minimize unsanitary conditions. The interceptor would allow an elimination of the health hazards attributable to septic tank failure in this area.

Projections of growth for Morrisville show a greatly increasing population. Waste disposal is and would be a limiting factor for this growth. Present and future peak flows expected in this interceptor are 0.1 mgd and 0.8 mgd, respectively (Figure 4).

d. Coles Branch Interceptor

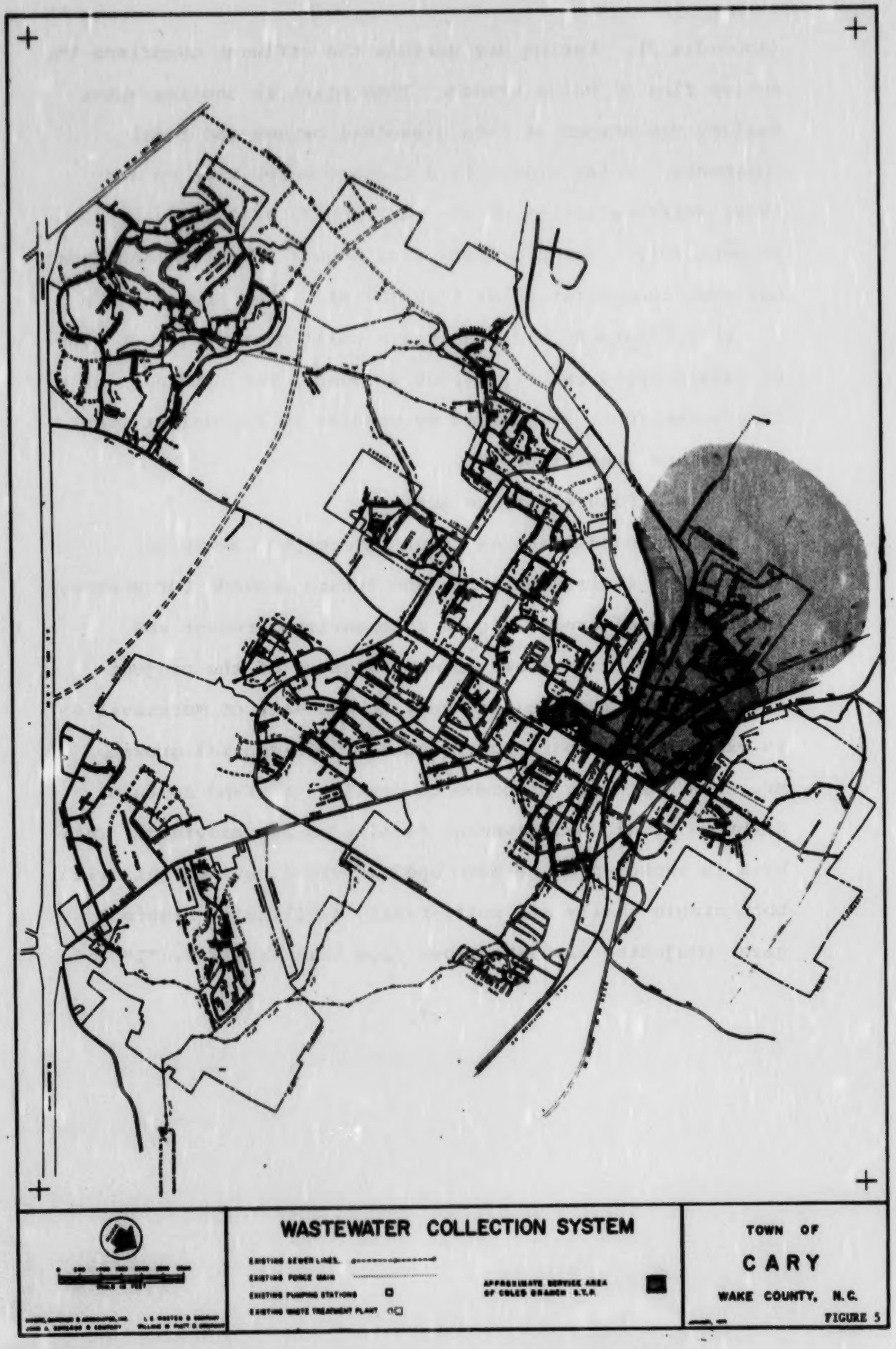
The proposed interceptor would eliminate the Cary wastewater treatment plant located on Coles Branch northwest of Cary. The plant has a capacity of 100,000 gallons per day with a present average flow estimated to be 60,000 gpd. It is a trickling filter type plant with effluent grab samples showing a 5-day BOD of 22 mg/l, fecal coliform values of 1000/100 ml, and suspended solids of 44 mg/l

(Appendix 3). During dry periods the effluent comprises the entire flow of Coles Branch. This plant is causing water quality violations of both dissolved oxygen and fecal coliforms. Coles Branch is a Class C water with DO and fecal coliform limits of 4.0 mg/l and 1000/100 ml respectively. Water quality data show a DO of 1.4 and fecal coliform concentration of 6100/100 ml. (See Appendix 3.)

This treatment plant serves a small portion (about 500) of Cary's approximately 10,000 persons. The remainder of Cary's residents are served by pumping to the Walnut Creek interceptor (See Figure 5).

e. Future Service Areas

The proposed Crabtree Creek interceptor sewer is designed to satisfy existing and future demands for sewerage in the project area. Figure 4 summarizes present and projected ultimate flows in each segment of the project interceptor. The area adjacent to and east of Morrisville is expected to experience pronounced residential growth. Mr. E. N. Richards proposes to develop the land south of Crabtree Creek when sewerage facilities are provided. This area is expected to be developed as mixed residential, with both single family and multi-family dwellings. Figure 4 gives projected ultimate flows from this area (PT. "I" and


EXISTING SEWER LINES
EXISTING FORCE MAIN
EXISTING PUMPING STATIONS
EXISTING WASTE TREATMENT PLANT
APPROXIMATE SERVICE AREA OF COLES BRANCH S.T.P.
SCALE IN FEET

WASTEWATER COLLECTION SYSTEM

TOWN OF
CARY
WAKE COUNTY, N.C.

FIGURE 5

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PT. "K") as 5.1 mgd (25,000 persons at 200 gpcd peak flow). This flow would accomodate a gross density of approximately 7 persons per acre.

Mr. J. T. Hobby has submitted an application for additions to the existing Mobile City Wastewater Treatment Plant. The proposed interceptor would allow expansion of the mobile park and residential growth in the adjacent properties without additional wastewater discharges to the Crabtree Creek Basin.

The Wake County Planning Department proposes the land northeast of Morrisville be developed as light industrial. Presently the area is rural with approximately one-third of the non-residential land in crops and pasture. Grains, corn and tobacco are the major crops. A few industries operate in this area (A. R. Gray Steel Fabricating Company, Tar Heel Wood Treating Company, Truss Builders, and Koppers Company), and additional industries are expected to locate in the area following the availability of adequate sewerage. There are three wastewater treatment plant discharges in the Little Brier Creek Basin serving industries(Appendix 3). Sycamore Creek, in a basin adjacent to the Brier Creek Basin, is classified "B" by the State for recreational purposes in Umstead Park. It receives the discharge from two inadequate industrial sewage treatment facilities. An interceptor force main and pumping system to tie in with the Crabtree Creek interceptor is proposed to eliminate the wastewater discharges in these basins and to satisfy future wastewater disposal needs. The projected flow (Figure 4) from this area is 13.3 mgd, which is sufficient to serve the Brier Creek and Stirrup Creek basins at a gross density of seven persons per acre.

A 635-acre industrial park is planned by Mr. J. W. York, immediately north and west of the confluence of Coles Branch and Crabtree Creek and adjacent to the SCS flood control structure No. 18. This development is also awaiting the provision of wastewater collection and treatment. Interceptor Pt. "C", the tie in point to the trunk interceptor, is anticipated to have a wastewater flow of 3.4 mgd which is sufficient capacity for greater than nine persons per acre.

The proposed Crabtree Creek interceptor, excluding the Richland Creek portion, is projected to service a combined present population of approximately 1000. Future flows in the interceptor are designed for a population in excess of 80,000 (20 mgd).

C. Description of Project Area

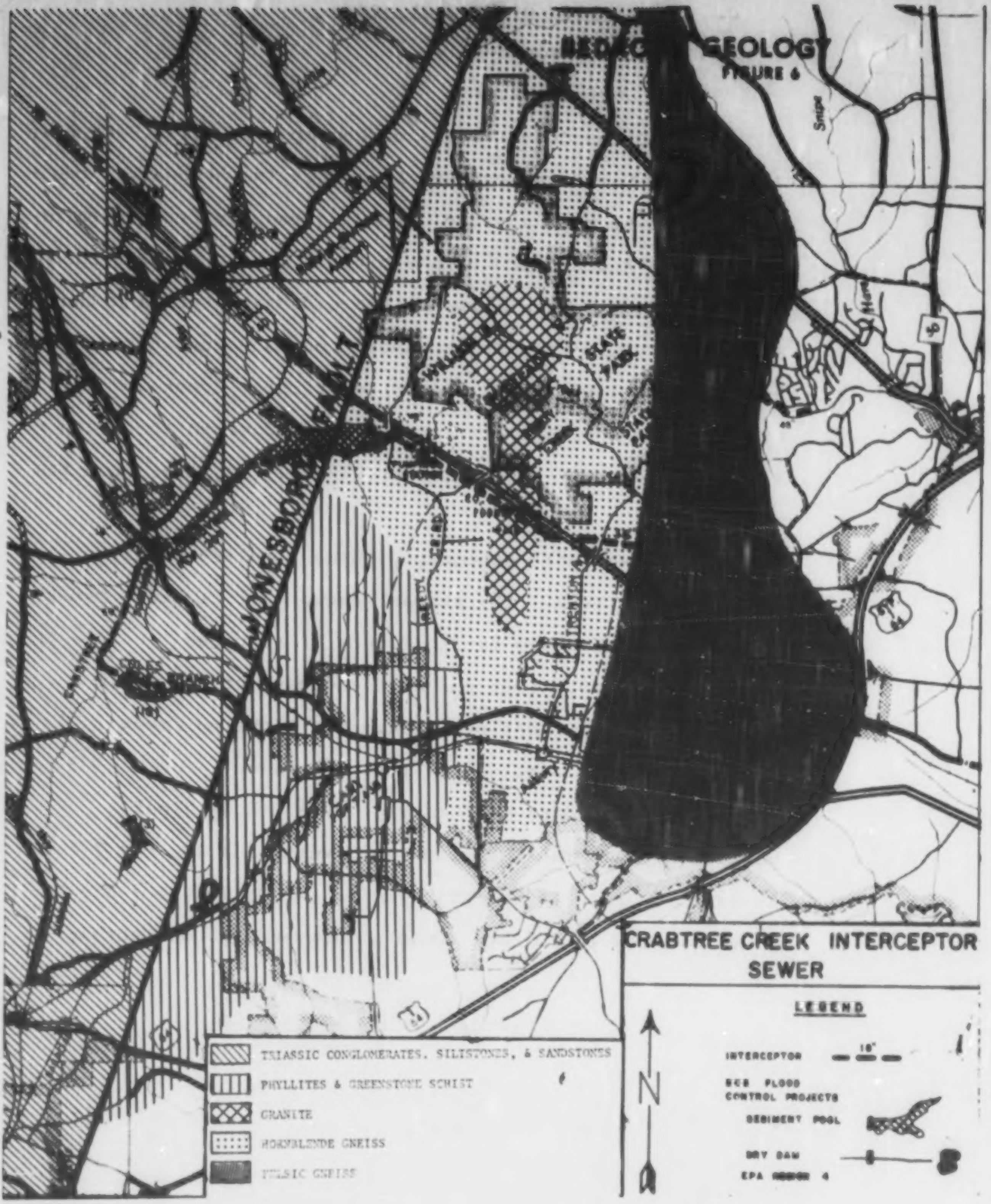
1. Natural Resources

a. Surface Water

The Crabtree Creek Watershed encompasses 90,750 acres in Wake and Durham Counties (See II.A.2). The headwaters begin on the east side of a ridge extending roughly from Research Triangle Park southward to the city of Apex. The watershed extends north above William B. Umstead State Park and the Raleigh city limits. The southern boundary runs through the Raleigh city limits separating the Crabtree Creek and Walnut Creek watersheds. Crabtree Creek discharges to the Neuse River southeast of Raleigh, approximately 20 miles from its origin.

The project area topography shows a relief rarely exceeding 180 feet. The stream gradient of Crabtree Creek west of the Jonesboro fault (Figure 6) averages approximately 10.5 feet per mile and east of the fault approximately 2.8 feet per mile. The Richland Creek gradient is approximately 37 feet per mile.

Stream flow data for Crabtree Creek shows great variation. At Crabtree Creek just west of I-40, the 7-day 10-year low flow is 0.3 cfs (USGS). At US 70 the 7-day 10-year low flow is 2.2 cfs (USGS). Conversely, on February 2,


BEDROCK GEOLOGY
FIGURE 6
JONESBORO FAULT
STATE PARK
Snipe
CRABTREE CREEK INTERCEPTOR SEWER
LEGEND
INTERCEPTOR 18"
SCS FLOOD CONTROL PROJECTS
SEDIMENT POOL
DRY DAM
EPA REGION 4
N
TRIASSIC CONGLOMERATES, SILTSTONES, & SANDSTONES
PHYLLITES & GREENSTONE SCHIST
GRANITE
HORNBLENDE GNEISS
FELSIC GNEISS

1973 and June 29, 1973, stream flows were estimated by the USGS to be 10,400 and 12,500 cfs at Highway 70. These flows were the highest on record and constituted an estimated 20-year flood (a flood which has a probability of occurring once every 20 years).

The water quality of Crabtree Creek is generally good. Data supplied by the North Carolina Department of Natural and Economic Resources, Office of Water and Air Resources, show that from the confluence of Coles Branch to the abandoned wastewater treatment plant in Oak Park, DO is 6.0 mg/l and above throughout. Fecal coliform values range considerably, from less than ten to above 10,000 per 100 ml sample. From this data it appears that either the chlorination of wastewater discharges is inadequate or septic tank drainfields are short-circuiting directly to surface waters. As described previously, the water quality of Coles Branch, Brier Creek, and an unnamed tributary (Mobile City Discharge) are in various degrees of degradation.

b. Geology

The discussion of geological features, soils, and groundwater has been excerpted from a Statement of Impact, Proposed Crabtree Creek Sewer Outfall, as prepared by Geological Resources, Inc. for J. W. York and Company, Realtors.

Bedrock Geology

> The area of the proposed sewer outfall is divided into eastern and western portions by the Jonesboro fault (Figure 6), a regional fault which extends in a northeasterly direction from Chesterfield County, South Carolina into Granville County, North Carolina. The fault dips approximately 65 degrees west-northwest....
> The Jonesboro fault has been inactive since the late Triassic or early Jurassic period (approximately 180 million years ago) and poses no threat of earthquake to the area. The fault now serves only as a boundary between the Triassic sedimentary rocks of the basin to the west and the pre-Triassic igneous and metamorphic rocks to the east.
>
> Field inspection of the area reveals that the outcropping Triassic sedimentary rocks are poorly consolidated siltstones, sandstones, and conglomerates.
>
> Triassic rocks are usually encountered between 35 and 100 inches below the surface (Soil Survey of Wake County, North Carolina, U.S. Department of Agriculture, Soil Conservation Service, 1970, pp. 21 and 61) and are difficult to dig or blast. These rocks are indurated well enough to refuse light digging equipment, and because of their clay content they tend to absorb the shock from blasting, producing large boulders rather than shattering into small pieces.

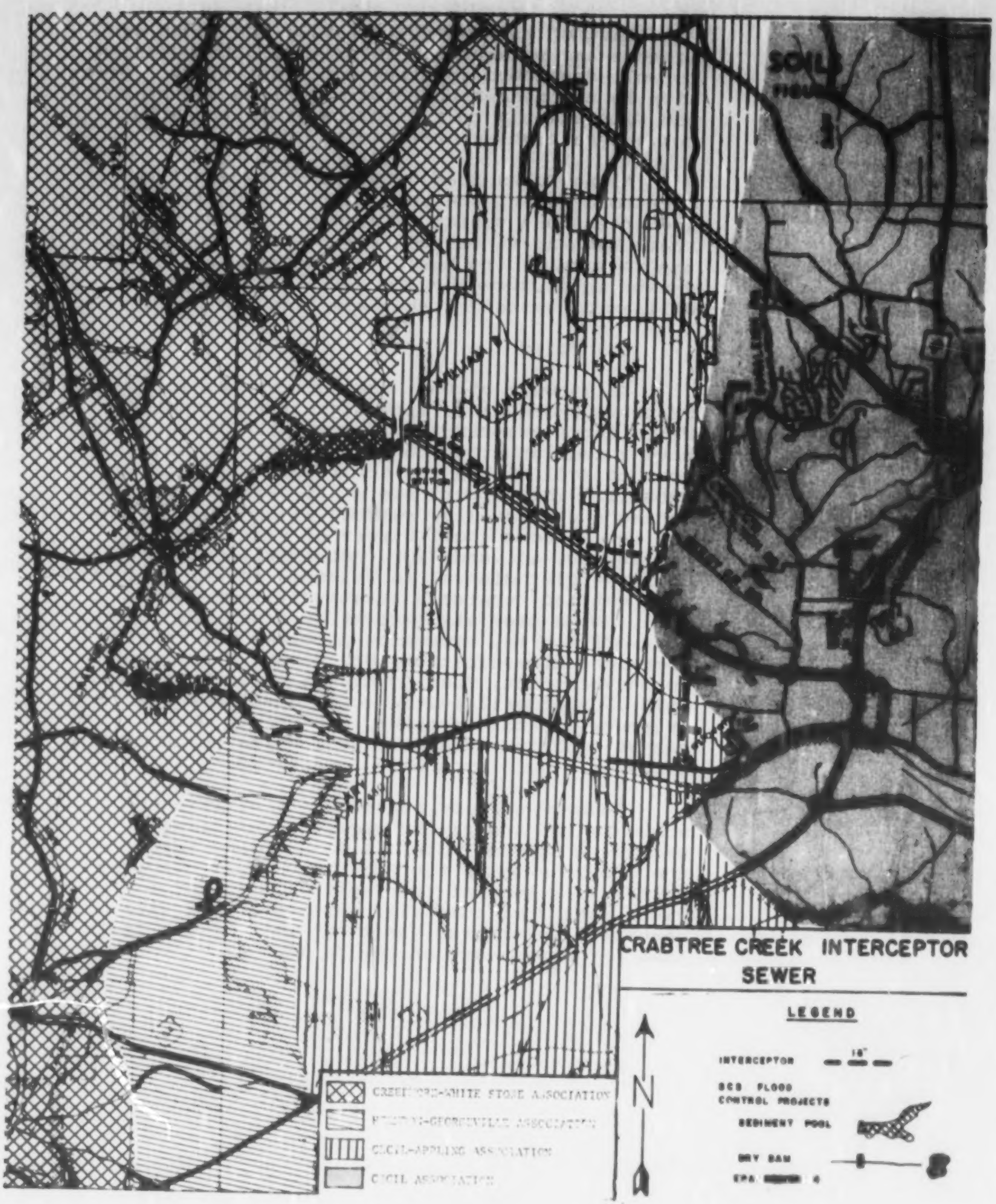
East of the Jonesboro fault, the rocks are igneous and metamorphic in origin, with moderate to well-developed jointing and fracturing. Foliation in the metamorphic rocks strikes northeast and dips steeply to the northwest in the area between Raleigh and the fault.

Along Coles Branch between Cary and the Jonesboro fault, the rock types are phyllite and greenstone schist (Figure 6). Along Interstate Highway 40 between Raleigh and the fault, the rock types are hornblende gneiss and felsic gneiss interrupted by a granite body in the William B. Umstead State Park area.

c. Soils

Soils west of the Jonesboro fault, in the Crabtree Creek area, are within the Creedmoor-White Store association (Figure 7). These soils have a reddish brown to yellowish brown sandy loam topsoil with a red to brownish red clayey subsoil. The subsoil has a low permeability producing a very shallow perched water table during the wet seasons (Soil Survey of Wake County, pp. 20, 60, 61, and 123). Montmorillonite, the dominant clay mineral in Triassic soils, expands when wet and creates a relatively impermeable soil. When over six percent of a soil is montmorillonite, expansion problems may result (personal communication, Mr. Robert Kirby, Soil Conservationist, Wake County Planning Department, 1974). Montmorillonitic soils also have the property of thixotrophism, a property which causes undisturbed stable loam soils to become somewhat liquid upon being disturbed.

Because of slow permeability of Triassic subsoils and underlying rocks, a relatively smaller amount of rainfall is absorbed into the ground west of the Jonesboro fault compared to the area east of the fault. Thus, for a given amount of rainfall, surface runoff will naturally be greater for areas west of the fault than for areas east of the fault.


SOILS
FIGURE 3
WILLIAM B. UMSTEAD STATE PARK
LEGEND
INTERCEPTOR
18"
SCS FLOOD CONTROL PROJECTS
SEDIMENT POOL
DRY DAM
EPA [redacted] 4
N
CREEDMOOR-WHITE STORE ASSOCIATION
HELENA-GEORGEVILLE ASSOCIATION
CECIL-APPLING ASSOCIATION
CECIL ASSOCIATION

CRABTREE CREEK INTERCEPTOR SEWER

Natural fertility of both Triassic soils and soils formed from crystalline rocks is low, and both require proper application of lime and fertilizer for good crop growth. Both soil types become cloddy and form a crust at the surface if worked when either too wet or too dry. Because of the more impermeable nature of Triassic soils, which retain a very shallow water table for a longer period of time compared to soils east of the Jonesboro fault, it is difficult to obtain a uniform stand of crops because of cloddy soils (Soil Survey of Wake county, pp. 63-68).

The alluvial soils making up the flood plain along Crabtree Creek are mostly soils of the Chewacle Series and Congaree Series. These fine, sandy loam soils have good infiltration capabilities, but because of high water table (season high depth to water table in soils of Chewacle Series is approximately 1.5 feet; season high depth to water table in soils of the Congaree Series is approximately 2.5 feet--Soil Survey of Wake County, pp. 18-19) these soils have a limited capacity to absorb additional water.

Soils in the area derived from igneous and metamorphic rocks are divided into the Cecil-Appling, Herndon-Georgeville, and Cecil associations (Figure 7). All of these soils have moderate permeability and shrink-swell potential and are typical in areas characterized by a gently sloping to moderately steep, well-drained topography.

d. Groundwater

Groundwater in the area to be served by the Crabtree Creek sewer outfall is generally of good quality. Ground water yields in the crystalline rocks east of the Jonesboro fault average 10 to 20 gallons per minute (10 to 15 gallons per minute in saprolite); groundwater yields in the Triassic rocks west of the Jonesboro fault average approximately 5 gallons per minute (3 to 5 gallons per minute in overlying soils) (Ground Water Bulletin Number 15, pp. 100-101).

Due to compaction, cementation, and intimate mixing of sand and clay, the Triassic sedimentary rocks are practically impermeable, and very limited percolation occurs along joint and fracture planes. However, joints and fractures permit moderate water percolation in the granite gneisses and schists east of the fault.

e. Climate

The Raleigh-Durham area lies between the mountains on the west and the Atlantic coast on the south and east. The mountains form a partial barrier to cold air masses moving eastward from the interior. As a result, this area enjoys a favorable climate where only a few days in the mid-winter have a temperature below 20°F. The average length of frost-free growing season is about 210 days.

Summer climate is influenced by the ocean, bringing warm temperatures and high humidities to the area. Afternoon temperatures reach 90°F or higher an average of every third day in mid-summer but rarely exceed 100°.

The 43.6 inch yearly average rainfall is well distributed throughout the year, with the heaviest in July and the lightest in November. Summer rainfall is generally produced by thundershowers and is occasionally accompanied by strong winds and intense rains.

f. Vegetation and Wildlife

The proposed project area lies within the eastern United States geographical and climatological region. Plentiful rainfall, combined with a long growing season, relatively mild winters, and the absence of any unusual limiting factors, allowed the development here of a well diversified mesophytic deciduous forest. A few limited modifications of the natural forest were made by the aboriginal population in the last few thousand years, but its almost total alteration was accomplished within the last 300 years by European settlers. As the climax vegetation was removed, biotic communities representing earlier successional stages become more prevalent. In many cases and at various times, these communities were, in turn, cut over. In some places, land whose natural cover was removed for use in row-cropping has been allowed to recover much of its original species diversity.

These man-induced changes, which took place irregularly and sporadically both in space and time, have left the project area a patchwork of agricultural lands, open fields and pastures, pure pine stands, unclassified previously logged areas, hardwood groves, roads, rights-of-way, narrow strips of bottom land vegetation along major and minor watercourses, and suburban and urban development. As a result, there is a great variety of trees, shrubs and associated flora. Appendix 4 lists some of the more common and interesting species.

Since much of the proposed sewer line right-of-way for this project lies adjacent to streams, tree species commonly found in floodplain areas will be most frequently encountered, including American beech, tulip tree, ironwood, river birch, black gum, red maple, sweetgum, American sycamore, and several species of oaks. Since streamside areas offer limited opportunities for intensive farming or for building permanent structures due to the obvious flooding hazards, many stretches of the creeks and streams have remained undisturbed. As a consequence, species diversity is high, vegetative structure and biomass are great, many ecological niches are present, and physical factors such as wind, temperature, and humidity are well damped within the sub-crown forest ecosphere. Such a community has high aesthetic appeal and represents an advanced stage of ecological succession.

Intimately associated with this diverse vegetative cover are a great many species of vertebrate and invertebrate animals. Table 3, prepared by the Soil Conservation

Table 3

WILDLIFE AND WILDLIFE HABITAT

SPECIES	Population Rating			Existing Habitat			Habitat Trend			Habitat Potential			No. Acres Potential Habitat	Comments
	Good	Fair	Poor	Good	Fair	Poor	Up	Down	Same	Good	Fair	Poor		
Deer, whitetailed		X		X				X		X			275,000	
Rabbits, cottontail	X			X					X	X			375,000	
Rabbits, marsh			X			X			X		X		50,000	
Squirrels, grey	X			X				X		X			300,000	
Bobwhite	X			X					X	X			375,000	
Dove, Mourning	X			X			X			X			75,000	
Ducks			X			X			X			X	20,000	
Geese			X			X			X			X	unknown	One flock in county
Turkey			X			X		X			X		175,000	
Furbearers:														
Mink, Muskrat			X			X			X		X		50,000	
Raccoon	X				X				X	X			100,000	
Fisheries														
Warm-water	X			X			X			X			20,000	Over 3,000 ponds in Wake County.

Service, gives an overview of population and habitat trends for the most common game and trapped species within Wake County. The principal game species found in the central and western portions of the project area include white-tailed deer, turkey, bob white quail, mourning dove, gray squirrel, eastern cottontail rabbit, woodcock and wood duck. Mr. P. S. Morgan of the U. S. Fish and Wildlife Service noted that the deer and turkey populations are generally confined to the lands adjacent to the Raleigh-Durham Airport and the William B. Umstead State Park.

J. D. Bayless and W. B. Smith of the North Carolina Wildlife Resources Commission reported species from the following orders of insects commonly found on stream bottoms; Diptera (mosquitoes), Trichoptera (caddis flies), Coleoptera (beetles), Ephemeroptera (mayflies), and Odonata (dragonflies). Oligochaeta (aquatic worms) and Gastropoda (snails) were also found. Many of these animals are food for the largemouth bass, redfin pickerel, redbreast sunfish, bluegill, crappie, channel catfish, yellow bullhead, and a variety of shiners and darters present in portions of Crabtree Creek, local farm ponds, or the 100-acre Umstead Lake. No anadromous fish runs have been reported in the streams in the proposed service area.

The project area supports many more mammalian and avian species as well as various reptiles and amphibians. The numerous terrestrial invertebrates are an important link in the area's food chains, and the resident bacteria, fungi, and other micro-organisms are necessary components of the nutrient recycling processes.

g. Background and Present Air Quality

Under the Clean Air Act of 1970, EPA was required to set National Ambient Air Quality Standards (NAAQS) that affect public health and welfare. To implement these standards EPA, in conjunction with each State Air Pollution Control Agency, developed a State Implementation Plan (SIP). Each State was divided into sub-districts known as Air Quality Control Regions (AQCRs). These regions were then classified on a priority basis for each of 5 pollutants. The priority classification ranged from priority I thru III, three being the lowest. These classifications were based upon either measured ambient air quality data, where such data was available, or estimated ambient air quality where data did not exist. These AQCR classifications were then published in the SIP. Wake County is part of what is known as the Eastern Piedmont AQCR. The Eastern Piedmont is classified as follows:

Pollutant	Priority Classification
Sulfur Dioxide(SO2)	III
Particulates (Part)	I
Oxidants (Ox)	III
Carbon Monoxide (C)	III
Nitrogen Dioxide (NO2)	III

A priority I means that the AQCR presently violates the NAAQS, and priority III means that they do not violate the standards.

The present existing ambient air quality for 1973 is as follows:

Pollutant	Location	County	Site Address	Concentration	Averaging Time
Part.	Raleigh	Wake	121 Seaboard Ave.	75 ug/m3	AGM
Part.	Raleigh	Wake	121 Seaboard Ave.	157 ug/m3	Max 24-hour
SO2	Raleigh	Wake	4465 Six-Forks Rd.	21 ug/m3	AAM
SO2	Raleigh	Wake	4465 Six-Forks Rd.	108 ug/m3	Max 24-hour

There is no measured air quality data for the Raleigh area for CO2, Ox, and NO2. The area is classified priority III for the above pollutants.

As mentioned earlier, the Federal Government sets minimum air quality standards for certain pollutants, although the States may set more stringent standards if they wish. National primary ambient air quality standards are set to protect the public health and secondary standards are set to protect the public welfare. Such primary and secondary standards have been set for carbon monoxide, hydrocarbons, nitrogen dioxide, photochemical oxidants, particulate matter, and sulfur dioxide (Table 4). Each standard specifies an averaging time, frequency, and concentration. The averaging times are 1, 3, 8, and 24 hours, and 1 year. The frequency parameter column of Table 2 specifies either annual maximum concentrations for averaging times of 24 hours or less, or an arithmetic or geometric mean for a 1-year period. The standards specify that the maximum concentrations are not to be exceeded more than once per year.

Table 4 NATIONAL PRIMARY AND SECONDARY AMBIENT AIR QUALITY STANDARDS

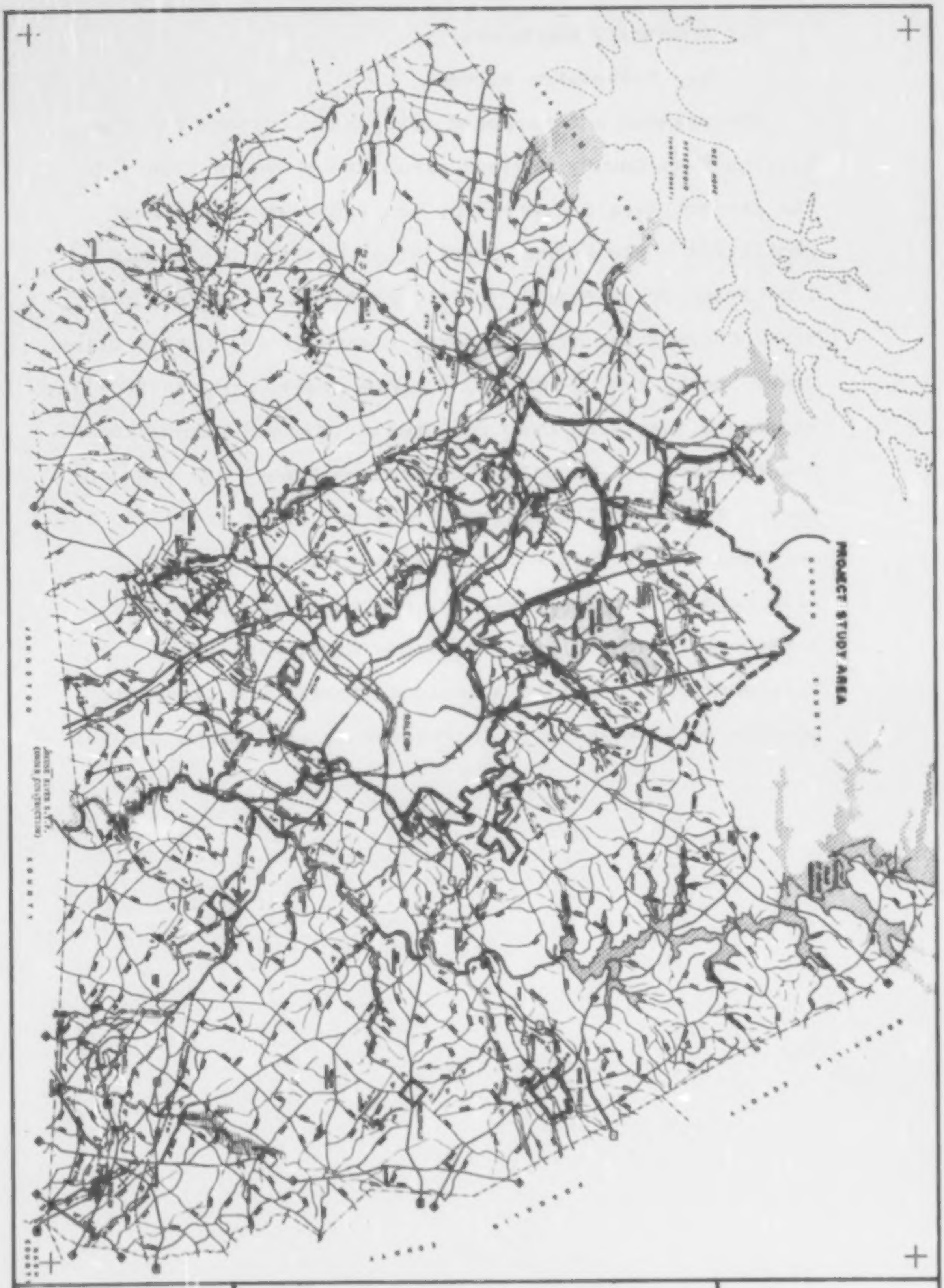
Pollutant	Type of standard	Averaging time	Frequency parameter	Concentration	
				μg/m^3	ppm
Carbon monoxide	Primary and secondary	1 hr	Annual maximum[a]	40,000	35
		8 hr	Annual maximum	10,000	9
Nitrogen dioxide	Primary and secondary	1 yr	Arithmetic mean	100	0.05
Photochemical oxidants	Primary and secondary	1 hr	Annual maximum	160	0.08
Particulate matter	Primary	24 hr	Annual maximum	260	--
		24 hr	Annual geometric mean	75	--
	Secondary	24 hr	Annual maximum	150	--
Sulfur dioxide	Primary	24 hr	Annual maximum	365	0.14
		1 yr	Arithmetic mean	80	0.03
	Secondary	3 hr	Annual maximum	1,300	0.5

[a] Not to be exceeded more than once per year.

2. Community Resources

a. Wastewater Systems

The present and proposed collection systems for the Raleigh-Wake County project areas are shown in Figure 8. The project area is served by ten wastewater treatment facilities - the Walnut Creek Plant and the previously identified Coles Branch (IB2d), Mobile City (IB2b), the Brier Creek Plant (IB2e), three plants in the Little Brier Creek Basin, two plants on Sycamore Creek, and one facility serving a quarry on Crabtree Creek. The old Walnut Creek plant serves all of Raleigh, Richland Creek, and most of Cary. This trickling filter plant was built in 1954. The new Neuse River Wastewater Treatment Plant (IB) will eliminate all of these plants, providing the proposed interceptors are built. The Neuse River Wastewater Treatment Plant will be a regional facility designed to provide adequate service to the county area through 2020.



WAKE WASTEWATER FACILITIES PLAN

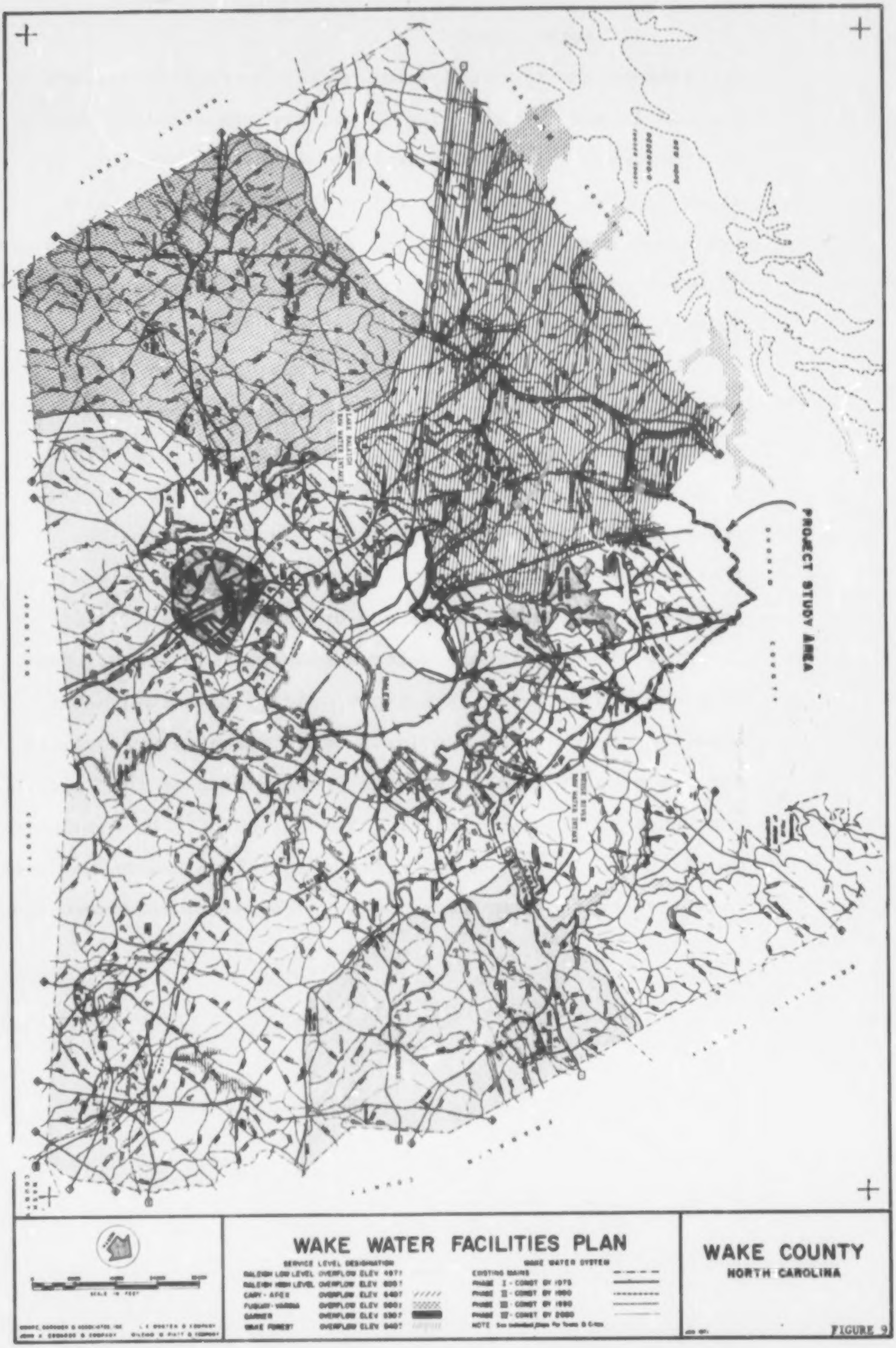
WAKE COUNTY
NORTH CAROLINA

b. Water Supply

Present and proposed water supply systems to satisfy demands in Raleigh and Wake County are presented in Figure 9. The Neuse River and Lake Raleigh are the present raw water sources. Present capacity of the Northside water treatment facilities is 25 mgd from the Neuse River, and the capacity of the Southside plant is 13 mgd from Lakes Raleigh, Johnson, Benson, and Wheeler. (Figure 9).

According to the Wake County Water Use Study (1970) surface waters are expected to remain the major source of water supplies in Wake County. The city contract with the U. S. Corps of Engineers is for a maximum of 100 mgd from the Falls of the Neuse Reservoir. The Southside Water Treatment Plant is to continue. The same report gives projected water use for wet and dry years (Figure 10).

Fig. 11 shows future water supply service areas. Note that the project area is not proposed to be served until sometime after 1980. Provision of adequate water supplies for the city of Raleigh assumes construction of the Falls of the Neuse Reservoir. In the interim, the city of Raleigh is proposing to provide a raw water supply from Beaverdam Creek to alleviate the immediate needs. Contract awards were made


PROJECT STUDY AREA
LAKE RALEIGH RAW WATER INTAKE
NEUSE RIVER RAW WATER INTAKE
RALEIGH
SCALE IN FEET
SERVICE LEVEL DESIGNATION
RALEIGH LOW LEVEL OVERFLOW ELEV 497'
RALEIGH HIGH LEVEL OVERFLOW ELEV 600'
CARY - APEX OVERFLOW ELEV 640'
FUQUAY - VARINA OVERFLOW ELEV 560'
GARNER OVERFLOW ELEV 530'
WAKE FOREST OVERFLOW ELEV 540'
WAKE WATER SYSTEM
EXISTING MAINS
PHASE I - CONST BY 1975
PHASE II - CONST BY 1980
PHASE III - CONST BY 1990
PHASE IV - CONST BY 2000
NOTE

WAKE WATER FACILITIES PLAN

WAKE COUNTY
NORTH CAROLINA

FIGURE 9

PROJECTED
TOTAL WATER USE
FOR WAKE COUNTY AND RALEIGH

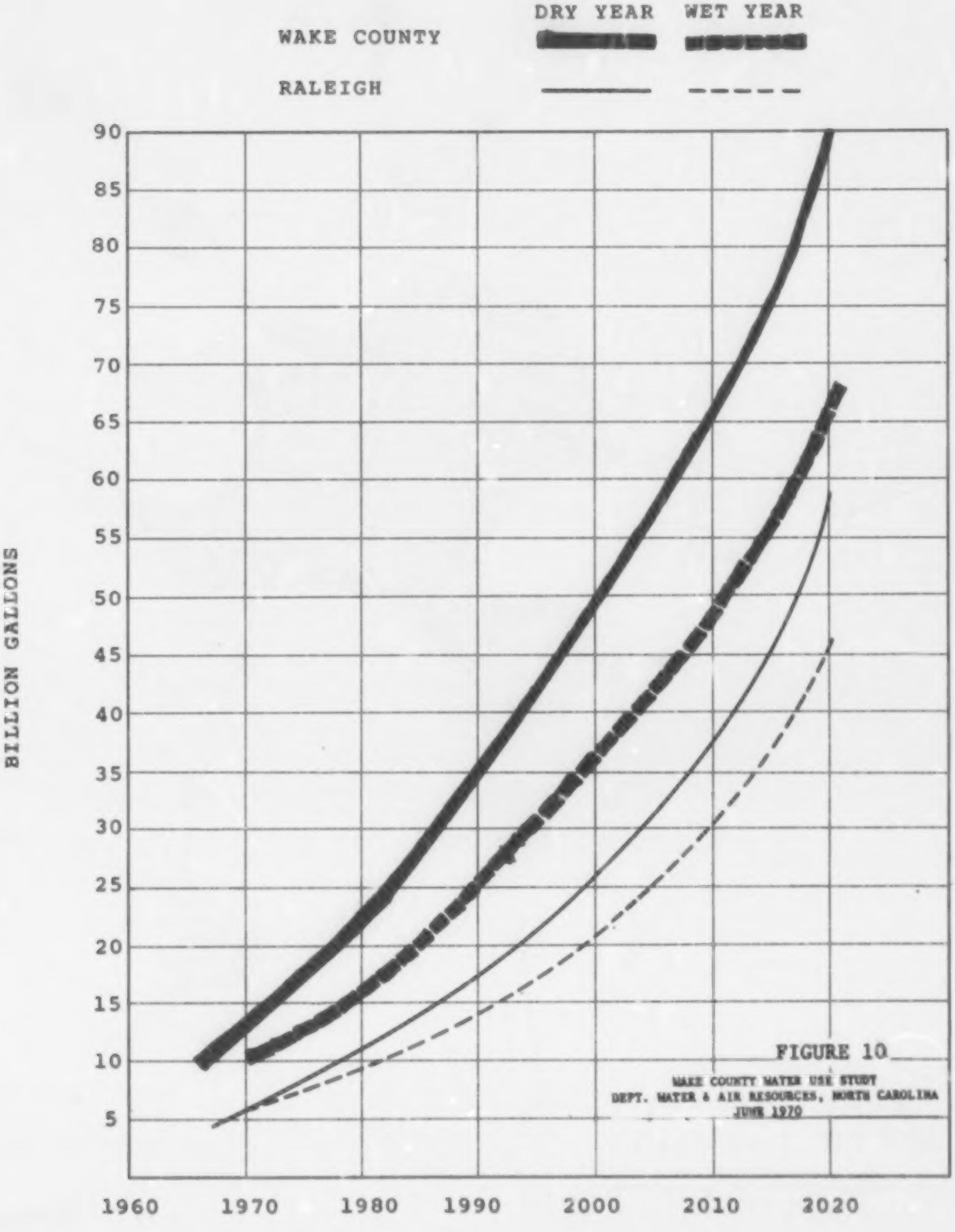
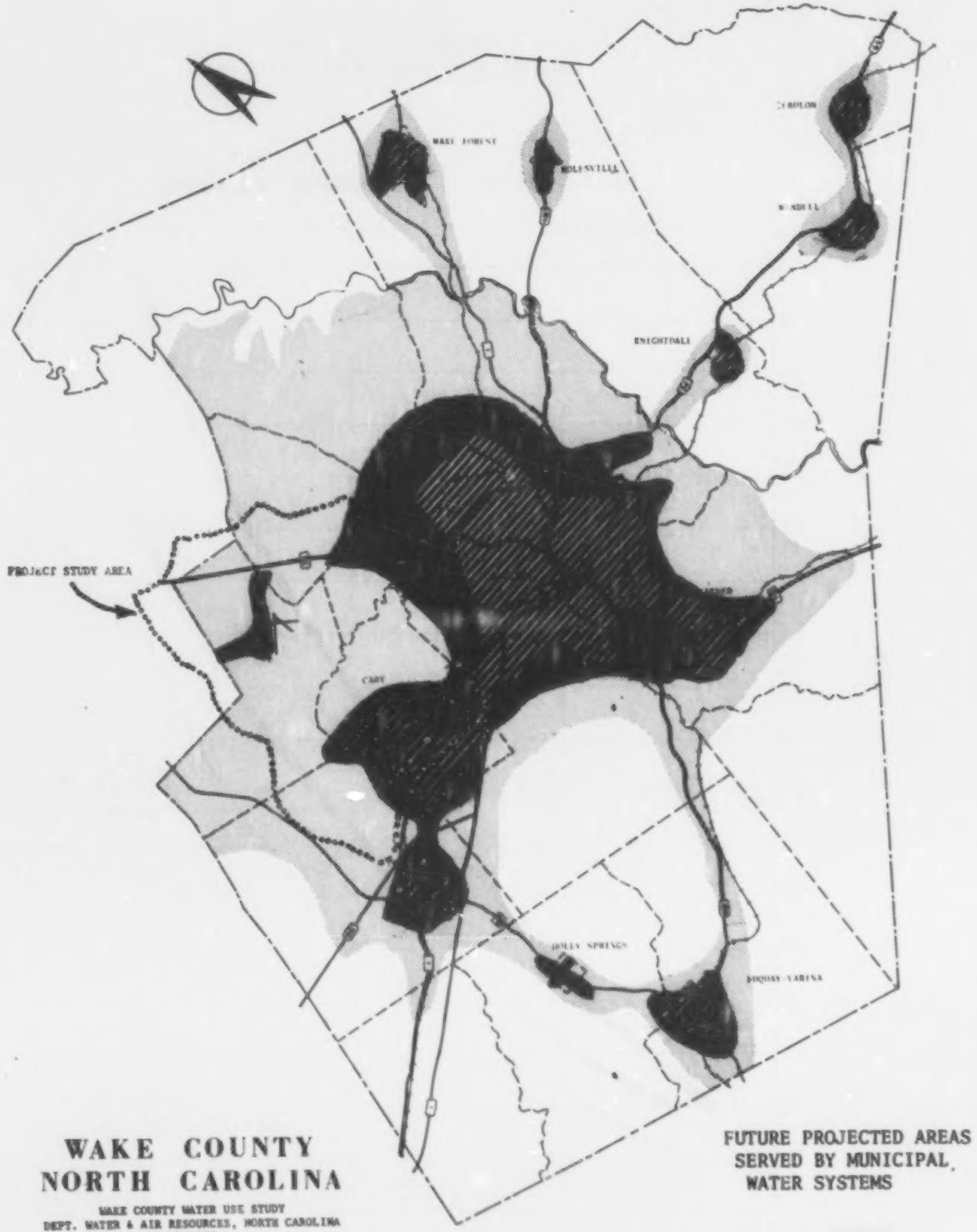


FIGURE 10

WAKE COUNTY WATER USE STUDY
DEPT. WATER & AIR RESOURCES, NORTH CAROLINA
JUNE 1970



WAKE COUNTY
NORTH CAROLINA

WAKE COUNTY WATER USE STUDY
DEPT. WATER & AIR RESOURCES, NORTH CAROLINA
JUNE 1970

FUTURE PROJECTED AREAS
SERVED BY MUNICIPAL
WATER SYSTEMS

1980 ■

2020 ▨

FIGURE 11

by Raleigh in October, 1973, and the project is financed by the city and a grant from the state. (See Appendix 7.)

The Cary area is in need of additional water supplies. Distribution and storage systems are inadequate. In order to satisfy future demand from development in the project area, additional water supplies and storage capacity will be needed.

3. Population Projections

The following figures and tables give projected populations for Wake County, Raleigh, Morrisville, and the Upper Crabtree service area.

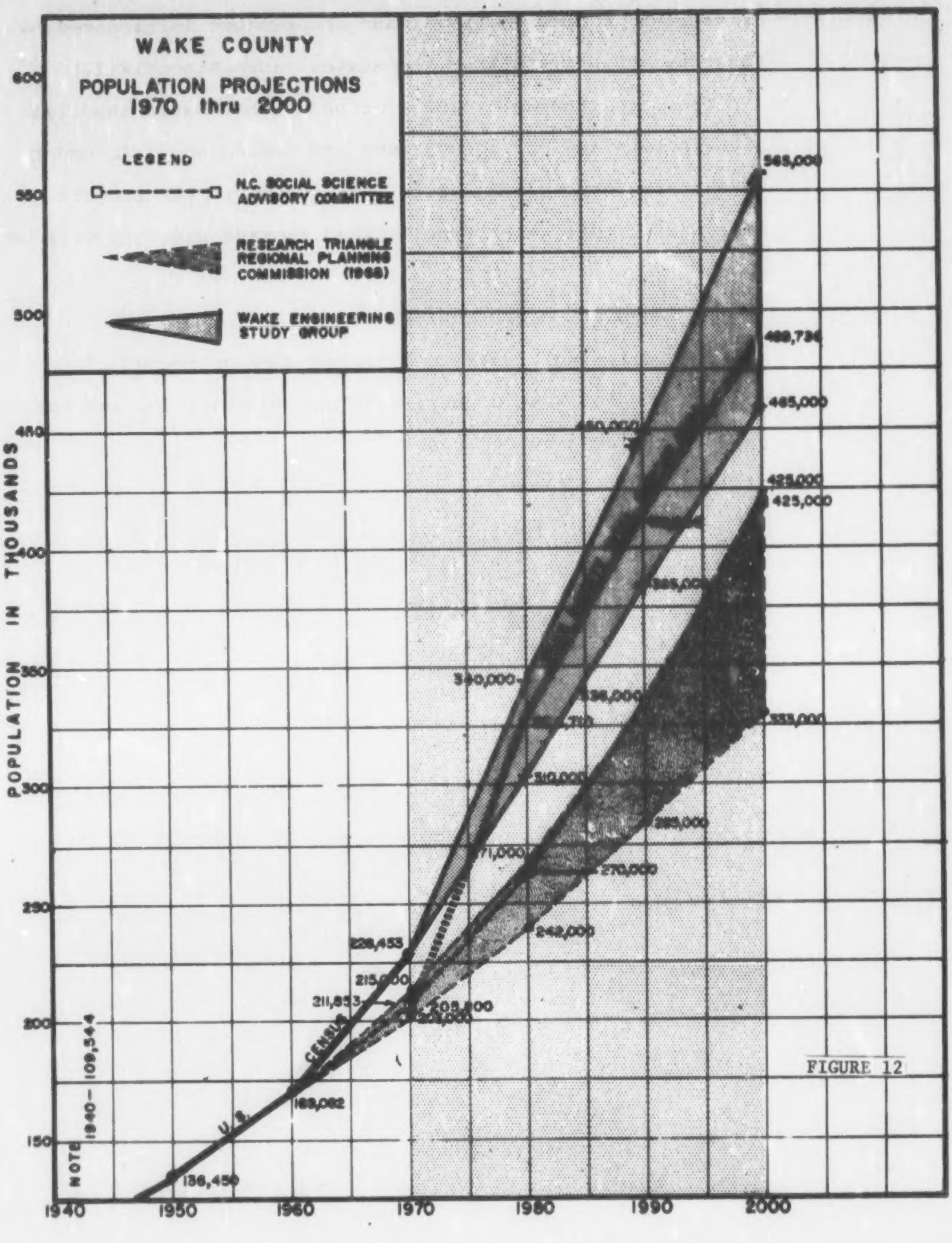

WAKE COUNTY
POPULATION PROJECTIONS
1970 thru 2000
LEGEND
N.C. SOCIAL SCIENCE ADVISORY COMMITTEE
RESEARCH TRIANGLE REGIONAL PLANNING COMMISSION (1968)
WAKE ENGINEERING STUDY GROUP
POPULATION IN THOUSANDS
600
550
500
450
400
350
300
250
200
150
1940
1950
1960
1970
1980
1990
2000
565,000
489,736
465,000
450,000
425,000
425,000
385,000
340,000
336,000
333,000
310,000
285,000
271,000
270,000
242,000
226,453
215,000
211,853
205,800
203,000
169,082
136,450
U.S. CENSUS
NOTE 1940 - 109,544

FIGURE 12

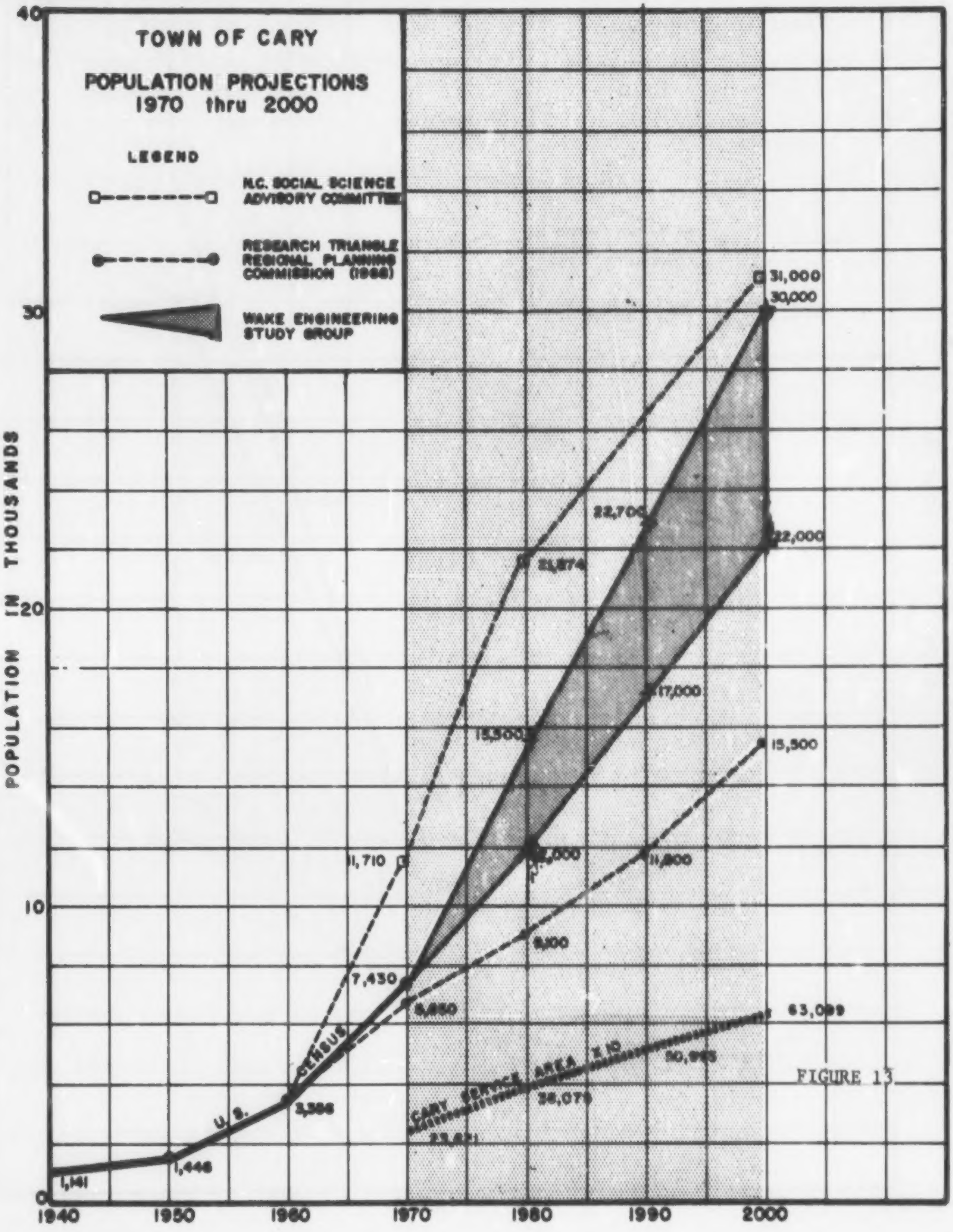

TOWN OF CARY
POPULATION PROJECTIONS
1970 thru 2000
LEGEND
N.C. SOCIAL SCIENCE ADVISORY COMMITTEE
RESEARCH TRIANGLE REGIONAL PLANNING COMMISSION (1968)
WAKE ENGINEERING STUDY GROUP
POPULATION IN THOUSANDS
40
30
20
10
0
1940
1950
1960
1970
1980
1990
2000
U. S. CENSUS
CARY SERVICE AREA X 10
1,141
1,446
3,356
7,430
6,650
11,710
21,874
15,500
12,000
9,100
22,700
17,000
11,800
31,000
30,000
22,000
15,500
23,621
36,079
50,965
63,099

FIGURE 13

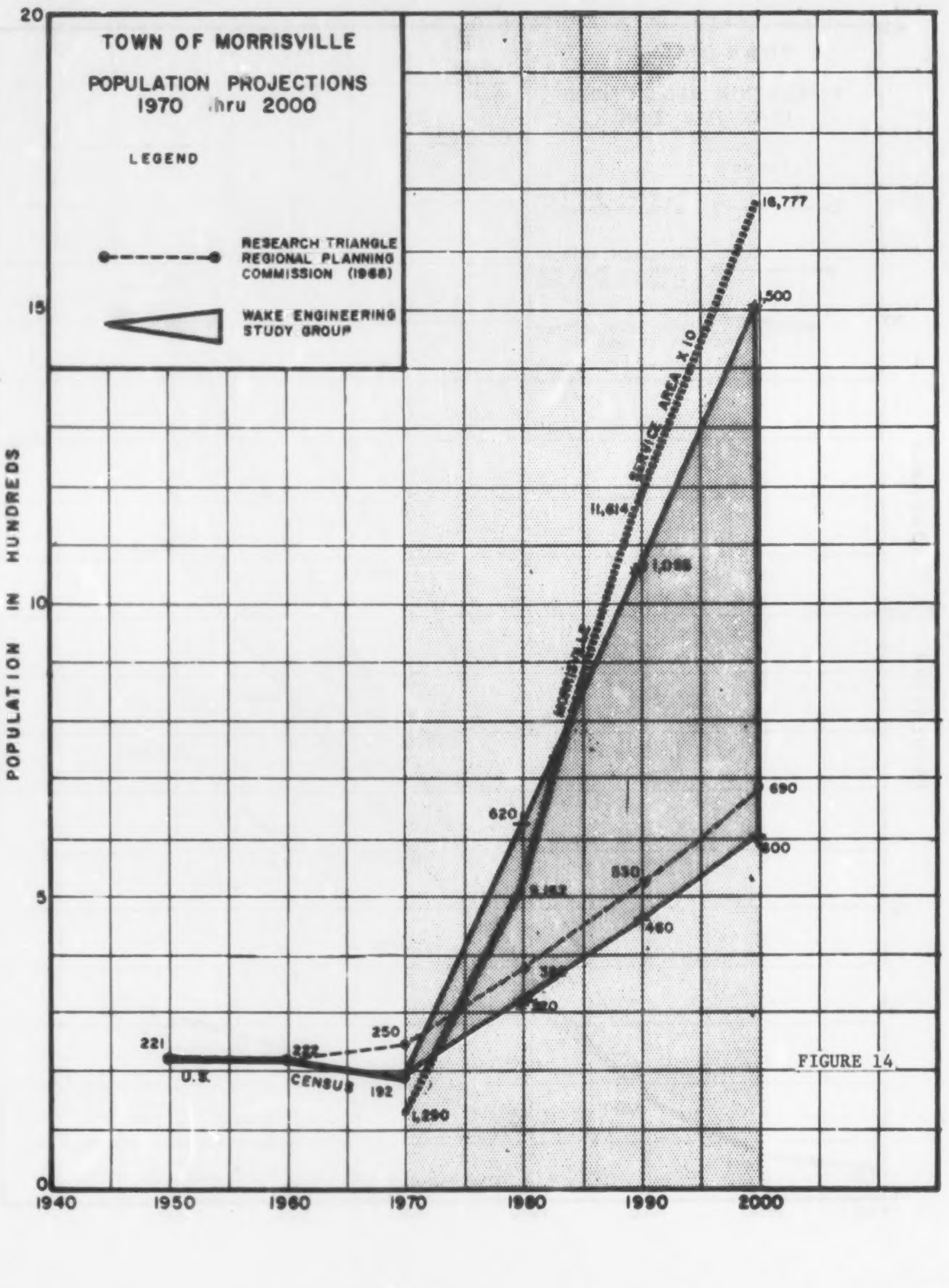

TOWN OF MORRISVILLE
POPULATION PROJECTIONS
1970 thru 2000
LEGEND
RESEARCH TRIANGLE REGIONAL PLANNING COMMISSION (1968)
WAKE ENGINEERING STUDY GROUP
POPULATION IN HUNDREDS
0
5
10
15
20
1940
1950
1960
1970
1980
1990
2000
221
222
250
192
U.S.
CENSUS
1,290
620
5,162
380
320
11,614
1,098
530
460
16,777
1,500
690
600
MORRISVILLE SERVICE AREA X 10

FIGURE 14

Table 5

Crabtree Creek Watershed Projections

Area	1970 (Census)	1980 (Est.)	1990 (Est.)
Raleigh urbanized area (Bureau of Census definition)	152,289	210,000	275,000
Town of Cary	7,389	30,000 (2)	NA
Wake County	228,453	288,910	342,277
Crabtree Creek Watershed (1)			
Wake County part	15,449	23,204	29,515
Durham County part	928	1,392	1,768
Both	16,377	24,596	31,283

---

(1) Upstream from intersection of Crabtree Creek and U.S. Highway 70

(2) Town of Cary located on drainage divide; southern half drains into Walnut Creek basin; northern into Crabtree Creek. Present estimate for 1980 being revised downward by Cary Planning Department.

Wake County Planning Department, 1974.

The Wake County Planning Department projections (Table 5) indicate a population increase in the Upper Crabtree Basin of approximately 8000 in 1980 and 14,000 by 1990. These projections are in close agreement with OBERS series E projections (Appendix 17). These projections appear small when compared with the project design flow. Construction of the project may greatly increase the population growth in this area. Since the projections were made on the assumption that the watershed population would continue to increase at about the same rate as previous growth rates of townships within the watershed, a higher growth rate might be expected with the provision of sewer and water utilities in the project service area.

From the Wastewater Treatment and Collection Master Plan (1971), the predicted population for the upper and lower Crabtree Creek Basin is as follows:

1973	107,940
1985	140,000
2000	185,000
2020	228,320

This data indicates an increase in population in the Crabtree Creek Basin of 78,000 persons by the year 2000. Assuming the entire increase to occur in the project service areas, the interceptor will be adequate beyond the year 2000.

Reasonable population projections assuming construction of the interceptor sewer do not appear to be available. Most available projections do not reflect the present trend toward development of the Upper Crabtree Watershed. The centralized location between Raleigh, Durham, and Chapel Hill, the proximity to Research Triangle Park and the Raleigh-Durham Airport, and the existence of major arterial transportation corridors suggest an acceleration of future growth and development in this area.

II. INTERRELATIONSHIPS WITH OTHER PROJECTS, PROGRAMS OR EFFORTS

A. Federal

1. Environmental Protection Agency (EPA)

The EPA, through the Federal Water Pollution Control Act Amendments of 1972, has authority to improve water quality by administering a program of grants for research, planning, engineering, and construction of wastewater treatment facilities and their appurtenances. The Amendments also authorize EPA to establish the National Pollutant Discharge Elimination System, under which EPA establishes a permit system for the discharge of any pollutant into the waters of the United States.

Section 208 of the Amendments provides for the development of an areawide multifacet wastewater management plan in areas with complex point and non-point source wastewater problems. The 208 plan will include controls for municipal and industrial point source wastes systems, for pollution emanating from diffuse sources, for protection of the groundwater, and for disposal of residual wastes. This program also includes the use of non-structural techniques, including the control of the use of land for water quality management. The program provides for a one-year period, following designation of a 208 planning agency, to set up a continuing planning process and two years thereafter to submit the initial plan to the Administrator. The Raleigh area has been designated the first 208 planning area in the U. S. The effective date of designation was April 10, 1974, and Region J Research Triangle Planning Commission is the designated planning agency.

The EPA, through the mandate of the National Environmental Policy Act (NEPA) of 1969, is co-author of this environmental impact statement. NEPA provides that a detailed statement by the responsible official, on recommendations or reports on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, be prepared. In the present context, the issuance of grant funds for construction of the proposed project is considered a significant Federal action.

2. Soil Conservation Service (SCS)

The development of the Crabtree Watershed, associated with the proposed project, will increase the probability of flood damages in the downstream areas (See IV.B.1.) The SCS has an ongoing flood control project in the Crabtree Creek basin. In March 1964, the SCS released the Crabtree Creek

Watershed Work Plan. The objectives of the plan were to reduce floodwater and sediment damage on agricultural floodplains and to provide 100-year storm frequency protection for the urban and industrial-zoned floodplain in and adjacent to the city of Raleigh by utilizing structural works of improvement, supported by land treatment.

This study was initiated as a result of a flood which occurred in May 1957, which hydrologic determinations indicated the storm to be of 6.7-year frequency. The storm flooded 50 homes, the Farmers Market, and other properties, causing damages estimated to be in excess of $100,000. Projections indicated a once-in-a-century storm would have damaged 189 homes and endangered numerous lives.

Following the flood, several committees were formed to study the problem and to recommend action. Wake County, the city of Raleigh, and the Neuse River Soil Conservation District (later subdivided into the Wake, Durham, Orange, and Wilson County Soil and Water Conservation Districts) then jointly sponsored an application for funds under the Watershed Protection and Flood Protection Act, Public Law 566. Planning assistance was authorized by the SCS on April 15, 1958, and the State then passed legislation enabling the establishment of either a watershed improvement district or a countywide program. The result was the formation of an improvement district which became the sponsor of the project in October 1960. The Crabtree Creek Watershed Work Plan was then prepared by the SCS, and Administrator Donald A. Williams authorized operations on September 25, 1964.

On November 2, 1965 a referendum was passed by the county voters to establish a countywide watershed improvement organization with the power to levy taxes. In May 1968, Wake voters approved a million dollar bond referendum to support the project.

The original plan called for 15 flood control structures and channel improvements. Since that time, structures No. 7, 15, 16, and 21 have been eliminated, and the need for flood damage reduction measures below structure 25 is being restudied by the Corps of Engineers. Table 6 shows the available design data for the remaining SCS structures.

To implement the plan, the Wake County Watershed Improvement District was formed. Its function was to obtain land, easements, and rights-of-way and a limited power of eminent domain was initially provided (when 75 percent of the total easements in a construction unit has been obtained). Since that time, comprehensive power of eminent domain has been provided. Monies for property must be

Table 6 - Structure Data

STRUCTURES WITH PLANNED STORAGE CAPACITY

CRABTREE CREEK WATERSHED, NORTH CAROLINA

ITEM	UNIT	STRUCTURE NUMBERS										
		1	2	3	5A	11	13	18	20A	22B	23	25
Class of Structure		A	A	A	B	B	C	A	C	B	C	C
Drainage Area	Sq.Mi.	2.06	1.43	2.33	8.85	4.57	8.15	2.51	10.92	3.73	51.86	81.86
Controlled	Sq.Mi.										28.10	56.92
Curve No. (1-day)(AMC II)		81	81	81	80	76	79	79	80	79	80	73
Elevation Top of Dam	Ft.	321.5	341.5	358.5	329.4	343.5	285.0	334.0	-	354.0	298.0	274.1
Elevation Crest Emergency Spillway	Ft.	316.0	335.5	352.5	323.0	336.0	275.0	329.0	-	349.0	284.9	258.5
Elevation Crest High Stage Inlet	Ft.		333.0	349.5		-	-	-	-	-	-	-
Elevation Crest Low Stage Inlet	Ft.	305.0	326.0	342.5	306.5	Dry Pool	252.0	316.0	-	335.0	276.0	Dry Pool
Maximum Height of Dam	Ft.	32.5	36.0	35 0	42.5	48.0	51.0	34.0	-	39.0	42.0	-
Volume of Fill	Cu.Yds.	67,474	53,469	97,272	(29,600)	106,200	177,944	99,837	-	69,410	(64,400)	-
Total Capacity1/	Ac.Ft.	668	476	785	2,890	1,339	2,640	714		1,117	9,298	4,569
Sediment Submerged	Ac.Ft.	167	114	199	315	-	356	91	940	180	1,850	-
Sediment Aerated	Ac.Ft.	22	16	25	415	217	89	12	123	18	148	969
Retarding	Ac.Ft.	480	346	561	2,160	1,122	2,195	611	-	919	7,300	3,600
Between High and Low Stage	Ac.Ft.	-	223	349	2,160	-	-	-	-	-	-	-
Surface Area												
Sediment Pool	Acres	28.6	26.7	45.0	62.0	-	53.0	22.0	-	36.0	511.0	-
Retarding Pool	Acres	64.2	57.0	80.0	280.0	85.0	143.0	77.0	-	99.0	1,096.0	392.0
Principal Spillway Design												
Rainfall Volume (areal)(1 day)	In.	8.0	8.0	8.0	8.1	8.0	8.0	8.0	7.8	8.0	7.7	7.7
Rainfall Volume (areal)(10 day)	In.	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.5	13.5
Runoff Volume (10 day)	In.	9.01	9.01	9.01	8.85	8.03	8.69	8.69	8.85	8.69	8.67	7.19
Capacity of Low Stage (Max.)	cfs	106	20.5	34	410	120	175	106	-	118	1,205	3,350
Capacity of High Stage (Max.)	cfs	-	99	155	-	-	-	-	-	-	-	-
Freq. operation - Emer. Spillway	% Chance	1	1	1	1	1	1	1	1	1	1	1
Dimensions of Conduit	Ft. or In.	30"	30"	36"	3-10' x 10'	30"	36"	30"	-	30"	2-5.5' x 5.5'	2-7' x 9'
Emergency Spillway Design												
Rainfall Volume (ESH) (areal)	In.	10.28	10.28	10.28	8.0	9.56	12.10	10.28	11.98	8.80	10.28	10.72
Runoff Volume (ESH)	In.	7.92	7.92	7.92	6.47	6.59	9.41	7.66	9.49	6.26	7.79	7.28
Storm Duration	Hrs.	6	6	6	6	6	6	6	6	6	6.2	8.82
Type		Veg.	Veg.	Veg.	Concrete Drop	Veg.	Veg.	Veg.	-	Veg.	Veg.2/	Veg.
Bottom Width	Ft.	250	130	300	-	260	328	320	-	160	400 2/	400
Velocity of Flow (V_e)	Ft/Sec.	5.46	6.10	6.23	-	6.0	8.8	5.2	-	5.33	7.6	10.2
Slope of exit channel	Ft/Ft.	.035	.035	.033	-	.040	.025	.035	-	.033	.027	.025
Max.reservoir water surface elev.	Ft.	317.8	337.3	354.2	324.7	338.1	278.9	330.6	-	350.8	288.1	263.0
Freeboard Design												
Rainfall Volume(FH)(areal)(-hrs.)	In.	25.08	25.08	25.08	15.40	23.30	29.50	25.08	29.50	15.40	25.08	26.36
Runoff Volume (FH)	In.	22.47	22.47	22.47	12.77	19.88	26.53	22.15	26.70	12.61	22.31	22.39
Storm Duration	Hrs.	6	6	6	6	6	6	6	6	6	6.2	8.82
Max.reservoir water surface elev.	Ft.	321.5	335.5	358.5	329.4	343.5	285.0	334.0		354.0	298.0	274.1
Capacity Equivalents												
Sediment Volume	In.	1.71	1.70	1.79	1.55	.89	1.02	.77	1.83	.99	1.58	.71
Retarding Volume	In.	4.37	4.54	4.52	4.58	4.60	5.05	4.56	-	4.61	5.77	2.65

1/ Crest of Emergency Spillway
2/ Dependent on Obtaining Adequate Bulk Length

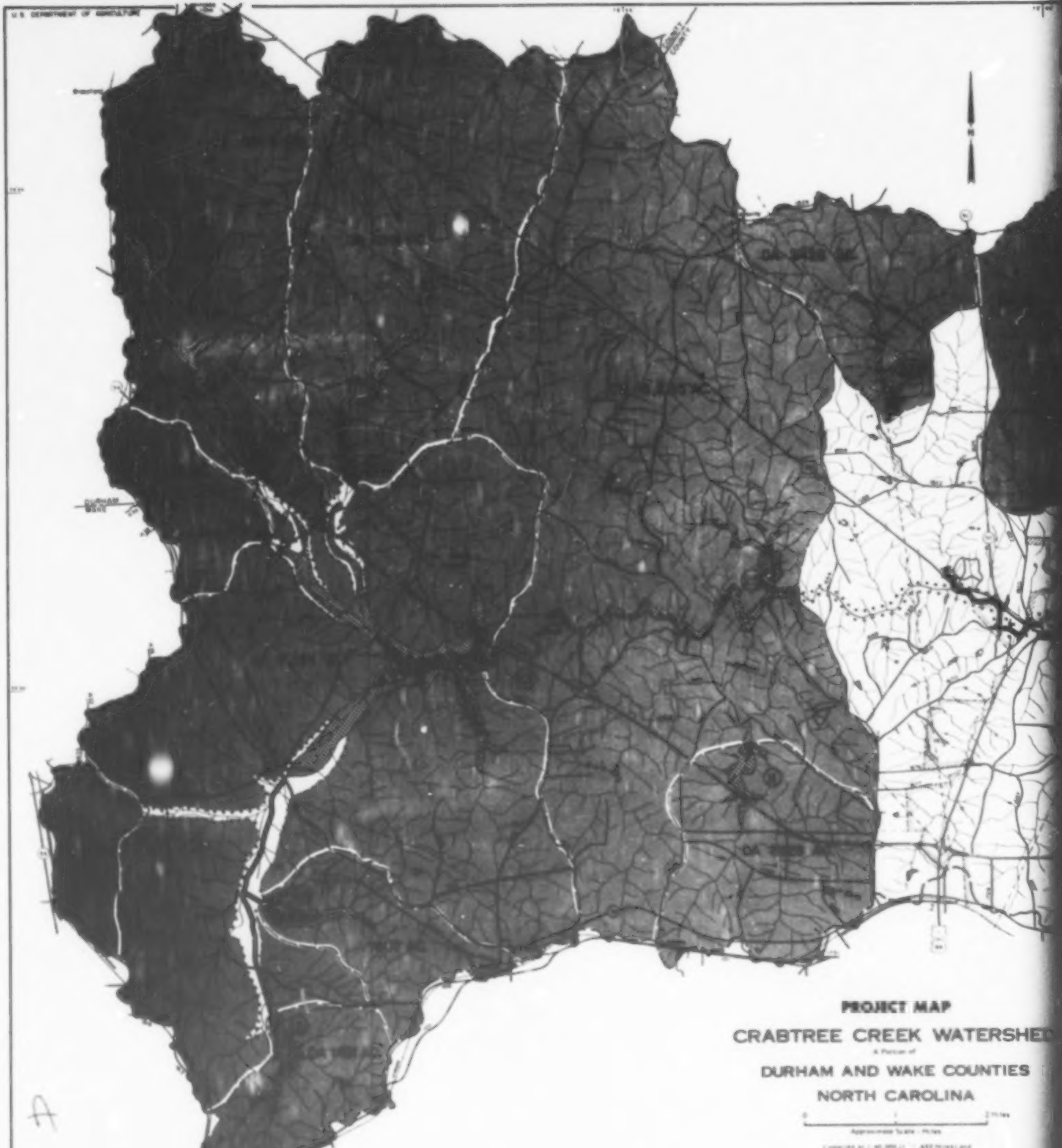
Date: August 1973

raised locally, while monies for construction of the control structures are provided by the SCS through P.L. 566 funds. It was expected that most of the land would be donated by developers, but this has not been the case.

Completion of the project has been very slow. Four structures--Nos, 2, 3, 13, and 18--have been completed, and two additional structures--Nos. 22 and 1--are under construction. (See Figure 15). There are not sufficient funds available for outright acquisition of the remaining lands, nor a reasonable expectation that they will be donated. Speculation has occurred and has greatly increased land prices.

The two largest floods on record occurred in February and June 1973 and flooding along lower Crabtree Creek was extensive. According to Corps of Engineers damage estimates, the two floods caused a total of $13.3 million in residential and commercial property damage.

Should the SCS project be completed and the associated downstream channel improvements implemented, flood protection from the 100-year storm will be provided for the city of Raleigh, and the severity of flooding in the upper watershed will be reduced. Figure 16 gives the projected flood stages as determined by the Corps of Engineers for



A

PROJECT MAP

CRABTREE CREEK WATERSHED

A Portion of

DURHAM AND WAKE COUNTIES

NORTH CAROLINA

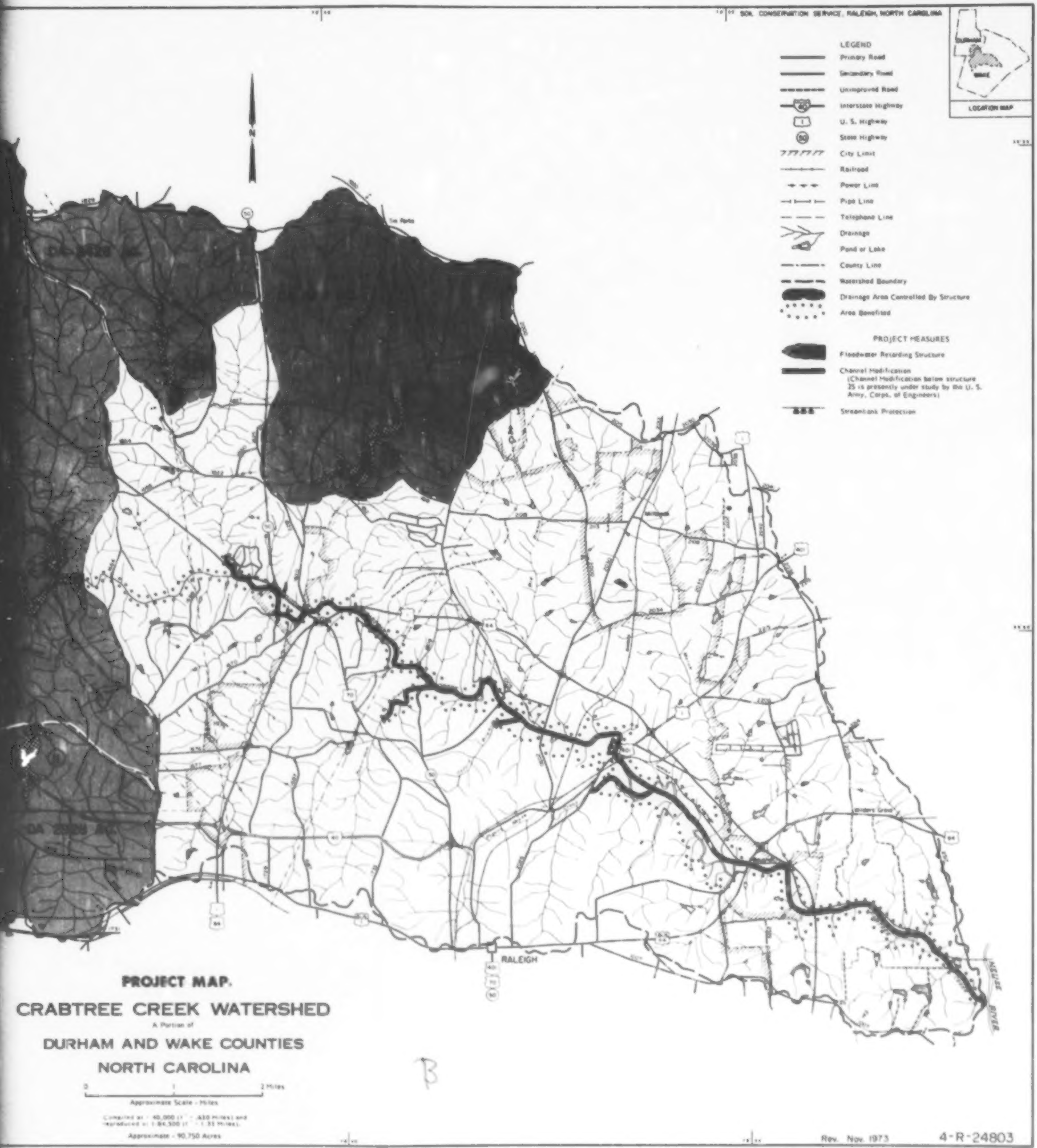
0 1 2 Miles

Approximate Scale - Miles

Compiled at 1:40,000 (1" = .633 Miles) and reproduced at 1:84,500 (1" = 1.33 Miles)

Approximate - 90,750 Acres

46-A



PROJECT MAP.

CRABTREE CREEK WATERSHED

A Portion of

DURHAM AND WAKE COUNTIES
NORTH CAROLINA

Compiled at 1:40,000 (1" = .630 Miles) and reproduced at 1:84,500 (1" = 1.33 Miles).

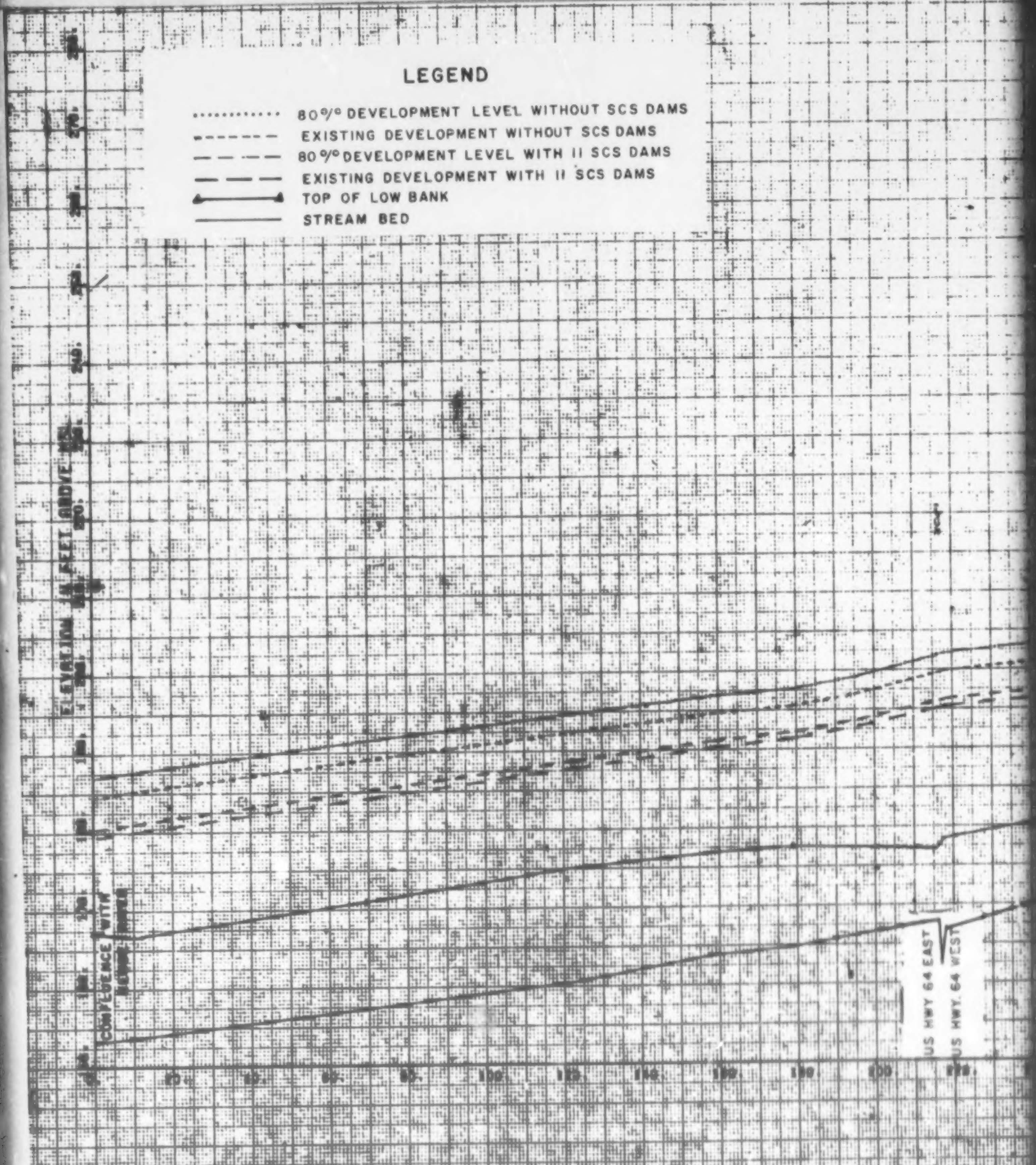
Approximate - 90,750 Acres

B

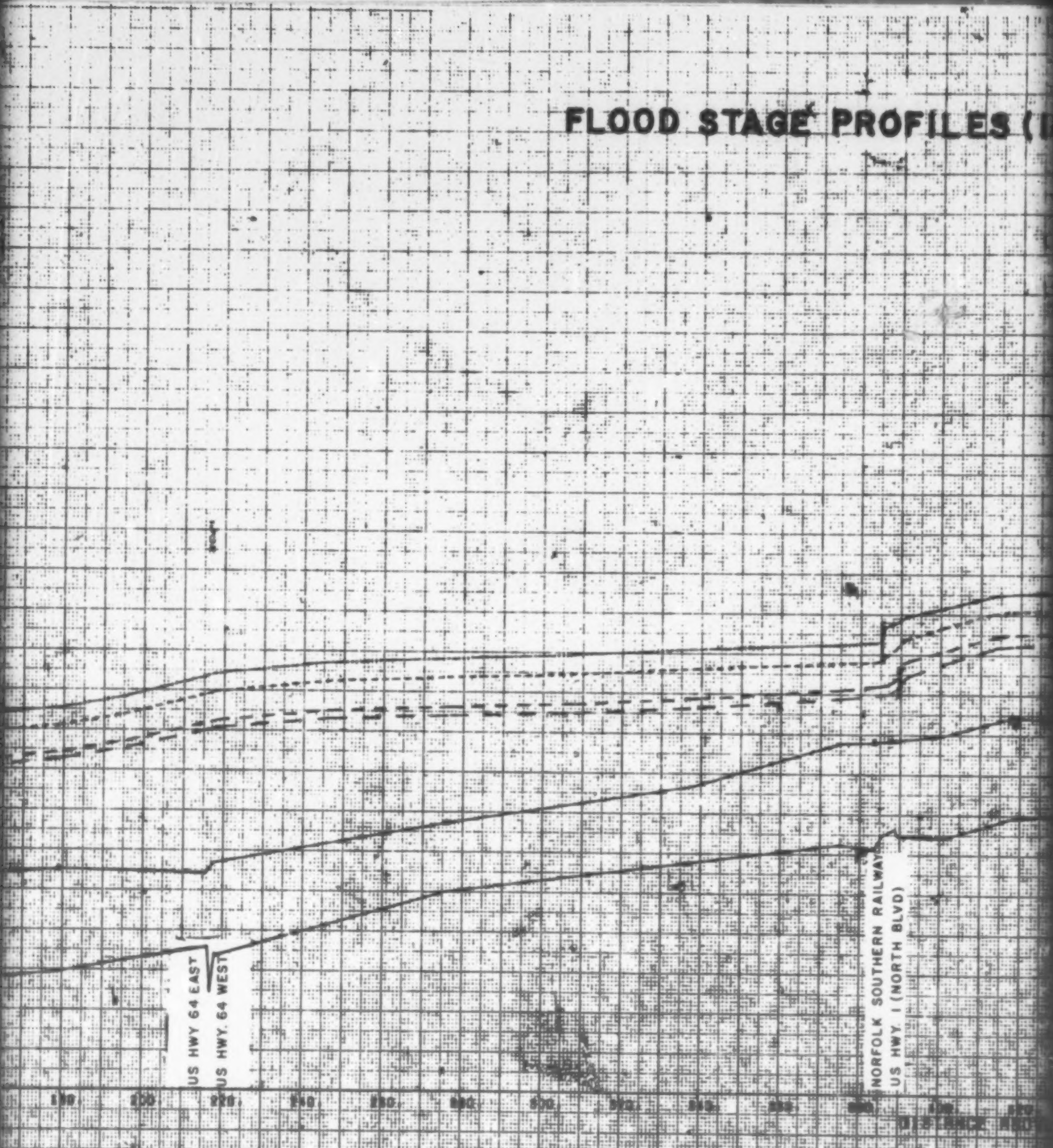
Rev. Nov. 1973 4-R-24803

Rev. Oct 1973 4-R-24802

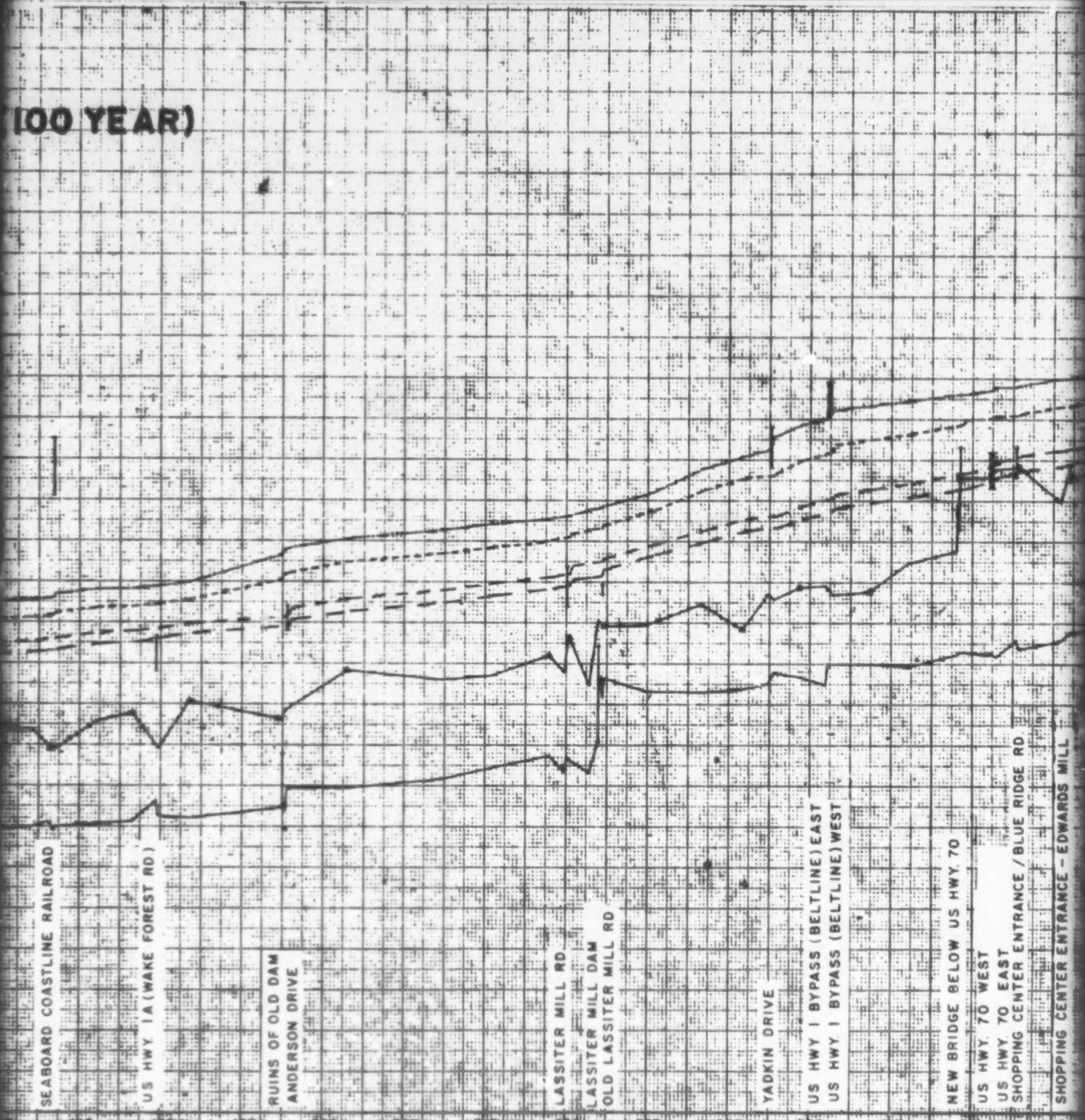
46-A


LEGEND
80 % DEVELOPMENT LEVEL WITHOUT SCS DAMS
EXISTING DEVELOPMENT WITHOUT SCS DAMS
80 % DEVELOPMENT LEVEL WITH 11 SCS DAMS
EXISTING DEVELOPMENT WITH 11 SCS DAMS
TOP OF LOW BANK
STREAM BED
ELEVATION IN FEET ABOVE MSL
270.
240.
CONFLUENCE WITH
US HWY 64 EAST
US HWY. 64 WEST
0.
20.
40.
60.
80.
100.
120.
140.
160.
180.
200.
220.

D


FLOOD STAGE PROFILES (I
US HWY 64 EAST
US HWY. 64 WEST
NORFOLK SOUTHERN RAILWAY
US HWY. 1 (NORTH BLVD)
180
200
220
240
260
280
300
320
340
360
380
400
DISTANCE ABO

B



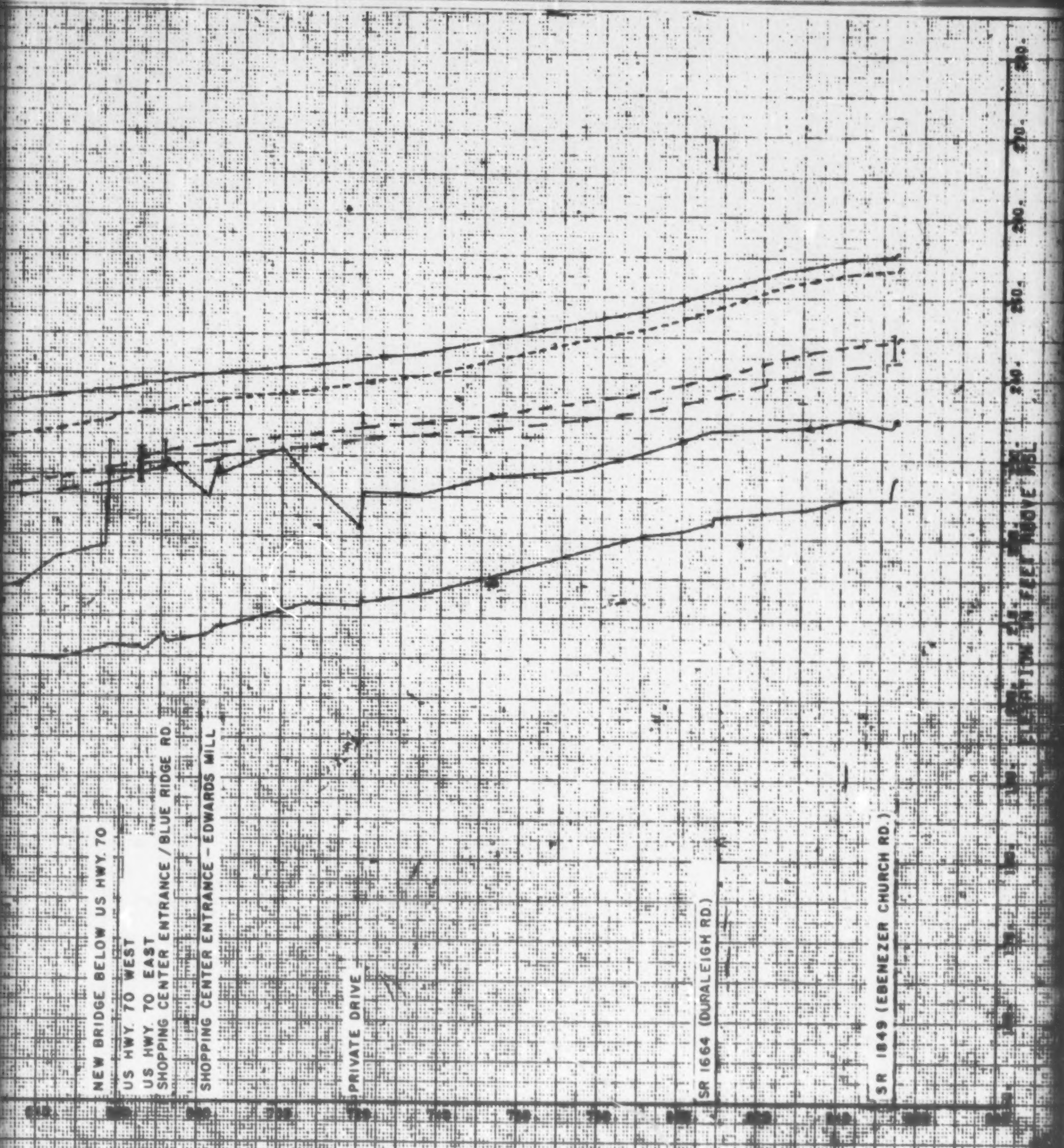
CRABTREE CREEK PROFILES

INTERMED. REG. FLOODS(100-YR EVENTS)

[illegible]

FIGURE 16

C



CREEK PROFILES

[illegible]

[illegible]

FIGURE 16

CORPS OF ENGINEERS
WILMINGTON DISTRICT

D

four conditions: existing development with and without the SCS structures and 80 percent development with and without the SCS structures. Sediment delivered to the mouth of Crabtree Creek will be reduced from 176,400 tons to 47,100 tons annually (as estimated in the 1964 plan). The plan calculates a primary benefit cost ratio of 2.5 to 1.

3. Corps of Engineers (COE)

The Wilmington District of the Corps of Engineers is studying Crabtree Creek from SCS structure No. 25 to the Neuse River in an effort to reduce the remaining flood damage, develop the recreational potential, and upgrade environmental quality. The proposed project interceptor and the associated development will affect this COE study by increasing the flows and stages that must be accommodated. The Corps study allows for considerable citizen participation through a citizens committee and public meetings. A list of problems, needs, and possible solutions has been prepared as a result of these meetings in collaboration with the Crabtree Creek Citizens Assistance Committee formed in conjunction with this study. (See Appendix 6.)

Future meetings will discuss alternatives for the watercourse, and from this input a recommendation as to the most reasonable course of action will be made.

B. State

The State of North Carolina Department of Natural and Economic Resources has primary responsibility for permitting point source discharges and sewer line construction, administering the State Clean Water Grants program for wastewater treatment works projects, and developing and administering a sedimentation control program.

Permit program regulations provide that a permit shall be required to: 1) make any outlets into the waters of the State; 2) construct or operate any sewer system, treatment works or disposal system within the State; 3) alter, extend, or change the construction or method of operation of any sewer system, treatment works or disposal system within the State; or 4) enter into a contract for the construction and installation of any outlet, sewer system, treatment works, pretreatment facility or disposal system or for the alteration or extension of any such facilities.

The Clean Water Bond Act of 1971 authorized $50 million from the Pollution Control Account for use in making State grants of up to 25 percent for the construction of wastewater treatment works projects approved for Federal grants. A resolution establishing a policy setting limitations on State Clean Water grants for wastewater treatment works projects accepted for Federal construction grants was certified January 18, 1973. This resolution limits the amount of funds available to 25 percent of the total cost or 50 percent of the non-Federal share of the eligible project cost, whichever is less. In the case of Crabtree Creek, the Federal government (EPA) is proposing to supply 75 percent of the eligible project costs, with the State share being 12.5 percent. (See Table 1.)

The State of North Carolina is in the process of establishing a program for sedimentation control. The 1973 session of the General Assembly ratified the Sedimentation Pollution Control Act of 1973 on May 9, 1973 to establish a program for the control of pollution from sedimentation. The stated purpose of this act is to provide for the creation, administration, enforcement of a program, and for the adoption of minimal mandatory standards which will serve to permit development of the State to continue with the least detrimental effects from pollution by sedimentation. This act provides for the creation of the North Carolina Sedimentation Control Commission under the Department of

Natural and Economic Resources, charged with developing and adopting rules and regulations for the control of erosion and sedimentation.

The State of North Carolina enacted an environmental policy act in 1971. This act, very similar to the National Environmental Policy Act, provides for the preparation of a detailed statement by the responsible official generally paralleling the Federal requirements. The Crabtree Creek project has been determined to require a State environmental impact statement. This document is being prepared as fulfillment of both Federal and State requirements.

C. Region J Research Triangle Planning Commission

Region J is the regional planning authority for the project area. This commission has approved the proposed project as consistent with regional planning objectives. (Appendix 5). Further, as presented in II A.1., Region J has been designated the planning agency for the 208 areawide wastewater management plan.

D. Wake County

Wake County is the applicant for the proposed project, and in this role assumes primary responsibility for satisfaction of application and EPA grant conditions. Further, the county assumes responsibility for mitigating potential adverse environmental impacts of the project. The County Commission, in response to this requisite, has passed a resolution presenting a plan of action to provide reasonable assurance that there will be no increase in the probability of flood damages and no increase in the extent of sedimentation resulting from development prompted by sewer line construction. The resolution may be found in Appendix 7.

The resolution recognizes that extension of water and sewer utilities into the Upper Crabtree Creek Watershed will encourage and facilitate development of land. It also recognizes that completion of a major sewer outfall prior to completion of flood control programs may cause an increase in flood and erosion intensity as a consequence of development.

The plan commits the Wake County Planning Department to completing a geophysical study to determine what changes in land use regulations will be necessary to prevent an increase in the probability of flood damage or sedimentation. These land use restrictions are to be included in the county comprehensive plan and land use code system. Floodplain and erosion control ordinances were adopted on June 3, 1974, and the county is committed to a program for accelerating completion of the flood control program. Recognition of these problems and the commitment to their solution is a major step in preventing environmental degradation from future development of the Upper Crabtree Watershed.

The Wake County Department of Public Health has authority for permitting septic tank installation. The department requires residences in the Upper Crabtree Watershed utilizing septic tanks to have large lots (40 - 60,000 square feet). Minimum allowable lot sizes are 30,000 square feet without public water supply and 20,000 square feet with a public water supply.

E. Cities

1. Raleigh

The city of Raleigh has a significant interest in the proposed project since the wastewater collected by this interceptor will be transported through its Crabtree Creek trunk sewer and treated at the new Neuse River treatment plant (Chap. I.B.). The city exercises primary responsibility for extensions of sewer and water service and maintenance in the Raleigh "perimeter area." This perimeter area is shown on Figure 17.

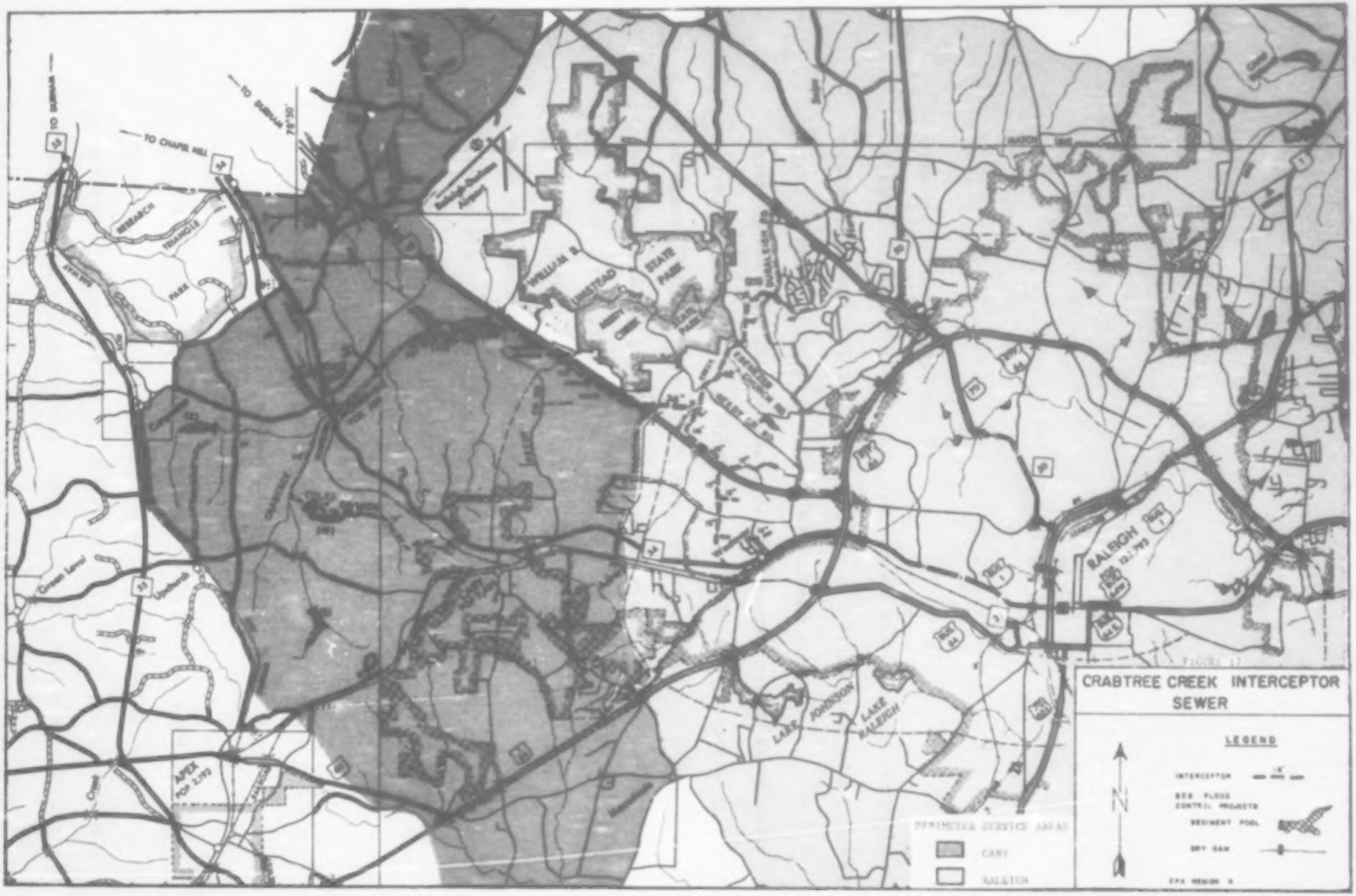


FIGURE 17

CRABTREE CREEK INTERCEPTOR SEWER

The city reserves the right to approve the plans and specifications of other interceptors outside its perimeter area tying in to the city system. In order to protect itself from possible increased flood damage, the city passed a resolution (Appendix 8) to establish a policy regarding the expansion of city facilities. The resolution resolves that

> ...the City of Raleigh joins the County of Wake in taking a position of not encouraging development of land which will necessarily result in greater liquid runoff, soil erosion and sedimentation until adequate devices have been installed to reduce those adverse effects of land development
>
> ...the City of Raleigh, to that end, hereby states a policy of not extending water and sewer service facilities -- or any other facilities under its control -- into areas of Wake County outside the City Limits, except in unusual circumstances, unless and until areas into which such services are extended and the area within the City Limits of the City of Raleigh are adequately protected, through the installation of related flood control and other such devices, and unless and until adequate facilities are available for the supply of water and the treatment of sewage.

The city has also passed floodway and sedimentation ordinances to help solve the flooding and siltation caused by further development within the city limits. There is still considerable undeveloped property within the city. Coordination or a combination of programs between the city and county could minimize costs and increase efficiency.

2. Cary

The northern portion of the city of Cary lies in the Upper Crabtree Creek Watershed. Should the proposed project be constructed, growth to the north and west of Cary will be accelerated. Careful coordination of control programs between the city of Cary, city of Raleigh and Wake County in the areas of utilities hookup, erosion and sedimentation, design densities, and land uses is necessary to ensure adequate and uniformly enforceable programs. Cary also has contractual agreement with Wake County delineating a perimeter service area (Figure 17). Cary assumes responsibility for water and sewer hookup and maintenance in this perimeter area.

Since Cary has the ability to annex portions of the Crabtree Creek Basin outside its present incorporated limits, it must coordinate extensions with Wake County to assure that the percentage of impervious surfaces above any one flood control structure does not allow a hydrologic overload to occur. Guidelines now being prepared by the Wake County Planning Department will provide the necessary data. The Region J 208 planning process may also provide future guidance.

Cary has indicated it intends to pass a sedimentation and erosion control ordinance similar to the Raleigh and Wake County ordinances. Should annexation become a reality, the city must take a responsible position in this regard and in following land use restraints and impervious surface limitations in the watershed.

F. Public

Various groups and citizens in the Wake County area have been active in environmentally sensitive matters. The Citizens to Save Umstead State Park had a profound influence on the area surrounding and in this park. The Raleigh-Durham Airport expansion plans were altered to eliminate the use of park lands and to reorient the proposed runway so the flight path would not be directly over the park. This citizen's group was also instrumental in assuring that the SCS flood control structure in the park would be a dry dam. Additionally, the relocation of the project interceptor around the park requested by the State of North Carolina and the National Park Service was supported by this group.

Another citizen's effort in the Wake County area is Project Flood Control. A petition circulated and signed by 6,000 residents of Wake County called for floodplain ordinances, soil erosion and sedimentation ordinances, controls for public works projects, and completion of the SCS flood control structures (Appendix 9). This endeavor has contributed substantially toward educating the public about these major current environmental issues and influenced passage of these ordinances.

Various other groups have likewise contributed substantially to identifying the environmental problem areas within Wake County. The Oak Park-Glen Forest-Deblyn Park Civic Association, the Sierra Club and the Crabtree Creek Citizens Assistance Committee (CCCAC) have been especially active. The CCCAC was formed as a part of the public participation program initiated by the Corps of Engineers on their study of alternatives for the Crabtree Creek channel between Structure No. 25 and the Neuse River.

III. ALTERNATIVES

Alternative routings of interceptors capable of satisfying the wastewater collection and disposal needs of this basin plus the "no action" alternative are discussed in this chapter.

A. No Action

The alternative of "no action" represents the withdrawal of EPA grant funds from the Crabtree Creek interceptor project. Should no action be taken, the adverse primary and secondary impacts attributable to its placement would not occur, and the benefits of adequate regional wastewater treatment would not be realized. Further, other adverse and beneficial impacts would occur.

Development of the upper basin would still occur, although at a different pace and in a different pattern. Due to the large lot size required for septic tanks, many areas would develop at a lower density. In other areas, developers may attempt to install their own package plants which would result in higher density development. For a package plant, siting approval would be required from the State Office of Water and Air Resources and the discharge would require a National Pollutant Discharge Elimination System Permit from the EPA. Although a very high degree of treatment would be required, a plant failure above Umstead State Park would be undesirable since Crabtree Creek in the Park is designated a Class B water (water contact recreation area). Due to low flow conditions in this basin immediately above the Park (0.3 cfs, 7-day,10-year), a relatively small amount of dilution water is available to serve as a safety buffer for Park users. For example, a typical package treatment plant serving 3,000 persons at peak discharge during low flow conditions would only provide a three parts sewage to one part natural flow dilution (assuming 200 gallons sewage per capita per day peak discharge).

The above limitations on discharges to Crabtree Creek could be expected to stimulate the use of septic tanks for development. However, this area is not very suitable for septic tanks since it has soil permeability limitations. Large lots would be required to ensure maintenance of health standards. Nevertheless, malfunctions could still be expected to occur.

In addition to the threat to water quality and sanitary conditions in the Upper Crabtree Creek Basin, to a lesser extent the same secondary impacts of development would occur under this alternative. There would be an increase in runoff due to an increase in impervious surfaces, an increase in sedimentation, an increase in urban runoff pollution, and an increased demand for community services. Since development would be expected to proceed at a slower rate and to be at a lower density, these impacts would be less immediate and less pronounced without the interceptor.

Should this "no action" alternative be opted, some other action would be necessary to improve the water quality of Coles Branch. This could be accomplished by upgrading the existing Cary plant to provide advanced waste treatment (since Coles Branch has a 7-day, 10-year low flow of 0.0 cfs), by pumping the wastewater from this plant to the existing Walnut Creek interceptor, or by using an alternative disposal method. Spray irrigation is possible if a proper area with adequate soil drainage could be found, but in this area this seems unlikely. Pumping to the Walnut Creek interceptor is also feasible and would involve the construction of a small pumping station and approximately one mile of force main.

"No action" may also be expected to have an impact on land use planning for the Crabtree Basin. The rate of development might be slowed and allow the preparation of the county land use plan and the regional 208 planning program to occur before irrevocable land use commitments are made. Unfortunately, deleterious developments could nevertheless occur. Clustering of high density developments around package plants in close proximity to watercourses presents a situation that could result in deleterious impacts. Alterations to natural drainage and potential erosion and sedimentation problems would be greatest in these areas.

The Wake County Planning Department, in the Plan of Action (Appendix 7), has given assurances that the present zoning of the Upper Crabtree Basin for septic tanks will be maintained unless the petitioner can present evidence demonstrating that existing zoning was applied in error or that circumstances have so changed since existing zoning was applied that the ordinance must be changed in the public interest. Strict adherence to this policy will provide a check against poorly planned and environmentally undesirable projects on a case by case basis.

The alternative of "no action" must be considered as a desirable alternative should efforts fail to provide adequate flood and sedimentation control. EPA does not desire to aggravate existing adverse conditions. Still, the more appropriate course of action would allow completion of the regional wastewater collection system following provisions for flood and sedimentation protection to downstream areas. Preventive action now would allow maintenance of environmental quality where future remedial action would probably be more difficult and more costly.

B. Alternative Routing

1. Walnut Creek

The proximity of the existing Walnut Creek interceptor which serves Cary suggests consideration of its use for transporting the wastewater generated in the Upper Crabtree Basin. The proposed interceptor includes a pumping station to be built west of Umstead State Park. By expanding the lift capability of this station, the wastewater from the upper basin could be pumped along Reedy Creek Road to the Walnut Creek interceptor and thence to the new Neuse River wastewater treatment plant.

There are several problems with this approach. The Walnut Creek interceptor is presently considered adequate to the year 2020 (See Table 7). Should the Upper Crabtree Basin wastes be added, a parallel interceptor would be required by 1995. Further, the proposed paralleling of part of the existing Crabtree Creek interceptor would still be necessary without the contribution from the Upper Crabtree area. As may be seen from Table 8, sections of the Crabtree

TABLE 7

2020 CAPACITY - WALNUT CREEK INTERCEPTING SEWER

Location From	To	Area Served (Acres)	Sewer Size	Required Capacity (mgd)	Existing Sewer Capacity (mgd)
Cary	Macedonia Road	3,770	25"	3.77	6.50
Macednia Road	Lake Raleigh	6,980	30"	6.98	14.00
Lake Raleigh	Lake Wheeler Road	9,130	30"	9.13	15.00
Lake Wheeler Road	Highway #70	11,050	30"	11.05	13.00
Highway #70	Cloverdale Road	14,730	42"	14.73	20.00
Cloverdale Road	Cloverdale Creek	17,990	42"	17.99	20.00
Cloverdale Creek	Existing STP	19,160	42"	19.16	20.00

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TABLE 8

1970 CAPACITY - CRABTREE CREEK INTERCEPTING SEWER

Location From	Location To	Area Served Acres	Sewer Size	Capacity Required mgd	Existing Sewer Capacity mgd
House Creek	Mine Creek	3,340	30"	2.30	7.50
Mine Creek	Beaver Dam Creek	10,540	36"	7.25	12.00
Beaver Dam Creek	Big Branch	13,660	36" 24"	9.40	14.00 4.50
Big Branch	Pigeon House Creek	19,510	36" 30"	13.40	13.00 8.00
Pigeon House Creek	Marsh Creek	23,890	42"	16.40	17.50
Marsh Creek	Pumping Station	30,140	42"	20.70	17.50

The above analysis is based on a maximum flow of 250 gallons per capita per day and the present population density of 2.75 people per acre.

trunk sewer are already at capacity. With continued expansion of existing service areas paralleling will be required within ten years.

This alternative, therefore, is considered unreasonable since it 1) would necessitate additional expenditures of funds for pumping and paralleling the existing Walnut Creek interceptor, 2) would not avoid paralleling the existing Crabtree Creek interceptor, 3) would not avoid any adverse primary or secondary impacts due to the proposed project, and 4) would cost more than the proposed projects. See Section 8 of Chapter VIII for additional discussion.

2. Pump to the New Hope Basin

This alternative was recommended in the Research Triangle Planning Commission's Development Guide based on information available in 1969, which projects 12 mgd of the Upper Crabtree Watershed wastes will be pumped to the New Hope River Basin via a pump located just west of I-40 on Crabtree Creek. This alternative would eliminate the force main around the Park but would still require the Turkey Creek and Richland Creek interceptors.

The Commission supported this proposal due to the following two factors:

- an effort to keep as much waste as possible out of the Neuse River, the Neuse being a major water supply source for the Raleigh portion of the Region and for downstream uses. With the Neuse being a water supply stream, it was logical to use the Cape Fear basin for as much thoroughly treated effluent as possible. (It is noted that North Carolina water law does not prohibit inter-basin transfer between the Neuse and the Cape Fear Basins.)
- an effort to eliminate the temptation of running a major outfall through Umstead State Park.

Both the Neuse Basin and the Cape Fear Basin in the Research Triangle Region contain the sites of major Corps of Engineer reservoir projects--the Falls of the Neuse and the Wilson Mills Reservoir in the Neuse Basin and the New Hope Reservoir in the Cape Fear Basin.

The Environmental Protection Agency, since the preparation of the Development Guide, has established equal water quality standards for reservoirs in both basins. Therefore, there is no longer merit in endeavoring to make the wastewater treatment process easier in the Neuse Basin by pumping some of the burden into the Cape Fear Basin. Such an effort would merely intensify the difficulty in the Cape Fear Basin.

The pumping and piping costs associated with this alternative would be significantly higher than those of the proposed project. Further, it has no particular environmental advantages. Wastewater from the Richland and Turkey Creek Basin would still necessitate construction of the Oak Park section and Richland Creek section of the project. Also, the proposed project avoids the deleterious impacts of a major outfall in Umstead State Park since the effluent will be pumped around the area. Additionally, equivalent adverse primary and secondary impacts would occur by pumping to the Cape Fear basin. For these reasons, this alternative was discarded.

C. Reduced Scope

There are various possibilities involving building only a part or parts of the proposed project. One of these possibilities is to build only the Richland Creek section of the interceptor. This alternative would allow the provision of service to the presently overloaded facilities in this basin.

The State Fairgrounds are now in need of additional capacity. Also, Carter Stadium, the National Guard Armory, the State Prison Farm and other wastewater generators in this basin are producing wastewater at the capacity of existing pumping stations and interceptors. There is a proposal to increase the capacity of the facilities serving the Fairgrounds because of the overloaded condition. By building the Richland Creek section of the proposed project, the ultimate Regional plan may be followed without interim "stopgap" measures.

The immediate need for provision of adequate sewage transmission in this basin is well founded. However, the same potential adverse effects from construction and induced development would be expected to occur. Increased flooding and sedimentation could occur due to development without control measures, and the impacts of interceptor construction would affect aesthetic qualities and also cause potential erosion and sedimentation impacts.

Greatly increased pressures for development would be placed on this basin. Existing non-public lands could be rapidly developed and public lands would become considerably more valuable. As discussed in Chapter II, approximately 60% of this basin is publicly owned. Land which in the future will be needed for constructing the dam for SCS structure No. 25 and probably No. 23 can be expected to raise in price.

This alternative may actually occur since requirements made in this EIS regarding flood control structure acquisition may necessitate reduction of the project scope. For example, the county may not be able to raise sufficient funds to purchase the land for the entire SCS project. In this case, the EPA would not fund those portions of the project for which adequate flood protection measures for downstream areas have not been provided.

Even with the above policy of not extending EPA funded interceptors into non-flood controlled areas, under this alternative, there is the potential for development located outside the Richland Creek basin to pump to this section of the interceptor. Local developers could, if the city and county allowed, complete other portions of the interceptor system. This possibility could pose the threat of increased flooding without controls, and at the same time, increase land prices for the necessary flood control structures since eventual sewering could be considered imminent.

Fortunately, if this reduced scope alternative becomes a reality, the city of Raleigh and Wake County have committed themselves to not extending sewer lines into areas which do not have flood control protection provided. But nevertheless, increased property values make the completion of the structures more costly.

IV. IMPACT OF THE PROPOSED PROJECT

The proposed project will have both beneficial and adverse impacts on the human environment. These impacts may be subdivided further into primary and secondary effects. The following chapter is a discussion of these impacts.

A. Primary Impacts

Primary impacts may be classified as those effects which are a direct result of the project. In the case of the Crabtree Creek interceptor sewer these include: improvement of water quality in the Upper Crabtree Basin, stimulation of development, alteration of ecological communities, erosion of soil from the construction areas, and loss of certain aesthetic values. These and other primary impacts are directly attributable to the proposed project.

1. Beneficial Impacts

The major beneficial impacts afforded by the project are the elimination of present and possible future wastewater discharges to Crabtree Creek and its tributaries, and the provision for regional wastewater treatment. The Coles Branch, Mobile City and, in the future, Brier Creek plants, which now contribute to the pollutant loading on Crabtree Creek, will be eliminated. Future discharges, the possibility of which may be evidenced by the presently unapproved requests for point source discharges received by the North Carolina Office of Water and Air Resources since 1970 (Table 9), will be precluded. Further, present and future septic tank operation in the unsuitable areas of the Upper Crabtree Basin may be avoided.

Table 9
Requests for Point Source Discharge

Persons Requesting Site Approval/Purpose	Date	Wastewater Discharge Volume Requested
Wester Lloyd Mobile Home Park	8-1970	50,000 gpd
Taylor Realty Company Industrial Park	5-1970	2,500 gpd
Castleberry Edgerton Co. Mobile Home Park	7-1972	25,000 gpd
Adams Realty Co. Industrial Park	8-1970	90,000 gpd (5,000 gpd approved)
J. W. York Subdivision	5-1971	500,000 gpd
The Ervin Company Subdivision	5-1971	500,000 gpd
Mobile Townes Corp. Mobile Home Park	6-1970	80,000 gpd (est.)
Ogburn Realty Company Industrial Park	12-1970	10,000 gpd (est.)

The placement of the proposed interceptor will also facilitate implementation of good planning and land use objectives. Areawide wastewater collection will allow other environmental considerations to be foremost among development priorities. Instead of development being located convenient to waste treatment facilities with spotty uncoordinated growth, considerations such as slope, transportation, vegetation, soils, water supply, and aesthetic values can have a greater bearing on the location and type of development.

2. Adverse Impacts

a. Wastewater and Sludge Disposal

The project will initially transport a peak of 2.3 mgd of wastewater to the Neuse River Wastewater Treatment Plant with ultimate peak flow projected at 20 mgd. This project further commits the city of Raleigh to its program of incremental increases in the size of the new Neuse River Wastewater Treatment Plant. The impacts associated with this plant are beyond the scope of this environmental impact statement. (I.B.)

Following treatment, the effluent will be discharged to the Neuse River containing 6 ppm BOD and 5 ppm suspended solids attaining 97 - 98 percent removal. Due to the low flow characteristics of the Neuse River, a high removal percentage is required to meet water quality standards.

The sludge generated at the Neuse plant will be disposed by landfilling adjacent to the treatment facilities. A research grant to recycle this sludge on North Carolina State farm lands and to study the effects has been proposed. This project is in the planning stage.

b. Erosion and Sedimentation

Underground sewer line construction requires excavation for pipe installation. Erosion of the exposed soils with the resultant sedimentation may be the result. Exposure of unprotected soil to the erosive energy of falling rain and overland flow, plus the action of men and machines at construction sites, can cause significantly increased soil loss and siltation. This loss of top soil not only is a waste of a valuable natural resource, but often creates undesirable sediment deposition in downstream areas. Continuation of this deposition can significantly affect the water-carrying capacity of a stream channel and increase flood stages. Further, increased turbidity may inhibit aquatic flora and fauna and significantly change the established predator-prey relationships. Photosynthetic activity of rooted aquatic plants may be impaired. Sediment contribution may also adversely affect water temperature, especially during the summer months.

In the case of this project, the situation is compounded since construction will occur adjacent to a stream course. This poses the possibility of disturbing the creek bank or adjacent rooted vegetation and could cause significant erosion from soil transport by the natural stream flows.

c. Construction Inconveniences and Annoyances

There will be minor inconveniences to traffic during crossing of roadways. Three paved roads--Ebenezer Church Road, Old Trinity Road, and the Youth Center Drive--must be disrupted. Two unpaved roads--Reedy Creek Road east of I-40 and Trenton Road--will be affected. Trenton Road may be closed during construction since the interceptor is projected to run 400 feet down its center line. N. C. 54 and I-40 at Richland Creek will be traversed by boring or tunneling and no disruption of traffic is expected. The remaining roadways--Duraleigh Road, Reedy Creek Road west of I-40 and I-40 at Crabtree Creek--will be crossed by passing underneath existing bridges. The impact on traffic from these crossings, excepting Trenton Road, is anticipated to be slight and of short duration.

Dust could present problems should dry conditions prevail. Standard methods for dust control will be utilized, including watering, and no significant impacts are anticipated.

Noise may be a substantial annoyance to residents living in close proximity to the construction. Equipment will be operated only during daylight hours, and the contractor should be directed to keep muffler systems functioning on all machinery. This impact will be of limited duration.

d. Aesthetics

Tree loss along Crabtree Creek will be a major aesthetic loss. As proposed, the project will cut a 13 meter (40-foot) right-of-way, resulting in a tree loss swath of at least 13 meters and possibly 16 or more meters (50 feet) due to root damages. Many trees, notably the beech, tulip tree, and loblolly pine, will not survive damage or disturbances to their root systems. Deposition of sediment, changes in water table, or damage to the roots will result in a high death rate. Special care should be given in developed areas where private yards are to be traversed if unnecessary tree loss is to be avoided. Reductions in the width of right-of-way should be made wherever possible in these areas. Due to the extreme hazard of pine bark beetles in the project area at the present time, special care should be taken during the construction phase. All seriously damaged trees, especially pines, should be removed as injuries often increase beetle susceptibility.

Regrowth of vegetation will not be allowed since access to the interceptor must be provided and damage to the pipe must be avoided. Maintenance of the interceptor right-of-way is to be provided by the city, although property owners may wish to give greater care to maintaining this area. No herbicides will be utilized to control vegetation on the right-of-way.

The original proposal for high manholes has been changed to provide sealed, bolted down covers. Plans call for a vent which would be above the 100-year flood level. This vent would be a visual distraction and should be avoided by using a snorkel device or underground piping to a ground level vent above the 100 flood level.

Since right-of-way clearing provides easy access from existing roadways, hikers, bicyclists, and motorcyclists may attempt to utilize this scenic route. Following revegetation, management and surveillance of the right-of-way may be desirable. The proposed greenway system provides a means for this kind of management.

Odors may be a substantial annoyance to persons subjected to them. Whenever wastewaters are allowed to become anaerobic, that is, without oxygen, malodorous gases may escape and become a nuisance to nearby residences. In the case of the Crabtree Creek project, there is a possibility that due to the length of the interceptor, flow time may be sufficiently long to allow the oxygen in the wastewater to be expended. Should this condition occur, odors would be produced. This potential will be avoided by providing aeration of the wastewater at the proposed pumping stations.

e. Disruption of Natural Drainage Patterns

In some areas the interceptor will cross ditches and other small surface water channels. This could result in disruption of the natural drainage patterns of some areas, creating ponds or wet areas. Due to the depth of the interceptor these instances are expected to be rare, and measures to preclude this occurrence have been provided in the engineering plans and specifications. Inspections should be made during and following placement of the interceptor to ensure that all areas have been adequately identified and protected, especially in existing residential areas (i.e., Oak Park). In those areas where problems occur, French drains or other relief methods must be utilized to provide adequate drainage before final grant payments will be made.

f. Archeological, Historical and Cultural

Two residences are listed in the Wake County Historic Inventory, the Trinity Road Cottage and the Nancy Jones House. Neither are located along the alignment of the interceptor sewer and no impact is anticipated. Mr. Thornton Mitchell, Acting State Historic Preservation Officer, states that care should be taken during sewer construction to protect the integrity of the Nancy Jones House; however, the restoration of the Trinity Road Cottage has lessened the importance of the building historically by gutting the interior and covering the original brick exterior with stucco.

Crabtree Creek itself is of considerable historical importance to Wake County as one of the earliest settlement areas. The 1775 Mouzon map (London) is one of the first showing the existence of the creek, which was named while the area was still part of Johnson County.

The State Department of Cultural Resources recommended and conducted a surface survey along the proposed interceptor line to identify significant archeological artifacts. Three potentially significant sites were discovered and recommended for further study (Appendix 14). The applicant will contact the Department of Cultural Resources before project construction to determine the most cost effective way of avoiding the destruction of signifcant cultural resources.

q. SCS Flood Control Structures

The laying of the project pipe may affect the future construction of the SCS control structures. Structures 11, 25, 23, and 18 all lie adjacent to the proposed project. The interceptor is planned to skirt around Structure 25 on the south side and to have sealed bolted man-hole covers where the cover is below the 100-year flood level. The interceptor is also routed to avoid Structure 18 on Coles Branch by passing on the north side above the 100-year flood level. The applicant should maintain close coordination with the SCS concerning the construction of the project.

3. Alteration of Ecosystems

Laying the large sewer lines involved in this project will involve the use of mechanized equipment. As a consequence, a right-of-way approximately 13 meters (40 feet) in width will have to be cleared of all impeding vegetation. A trench about three meters (nine feet) wide will be excavated, with the removed dirt temporarily piled adjacent to the cut. Wheeled and tracked vehicles will ply the right-of-way, compressing the upper soil layers of areas not trenched or covered with removed soil. The branches of trees and shrubs that extend into the working space of the entrenchment machines will be removed. In general, the natural communities located in the path of the line will be severely traumatized. Most subterranean and surface forms of insects and other invertebrates will be killed when the soil horizons are mixed, covered, or crushed by heavy equipment. The population dynamics of the soil micro-flora and fauna will also be significantly altered.

After the sewer pipe is in place, the ground surface above it will be seeded with quick-growing grasses to control erosion. The right-of-way will be kept permanently clear of any vegetation that might hinder periodic maintenance and inspection. This means that no significant woody vegetation will be allowed to encroach. Normal plant succession on disturbed land in the Crabtree Creek area leads to a forest cover as the climax type, thus continuous effort and energy will have to be expended to maintain the right-of-way.

The degree of permanent change made in the biotic community located on the right-of-way site depends naturally upon the original type of community. (Appendix 15). Areas that have been cleared within the last two years, and areas used as pasturage, will experience little change. Within two to five years, surface indications of the presence of the line on these sites will be very small. Areas thickly covered with large deciduous trees and their associated understory vegetation will suffer the greatest temporary and permanent alterations.

In most cases, species diversity will be reduced along the right-of-way whenever it passes through a natural community, although in some special cases, such as routing through a dense eight- to fifteen-year-old pure pine stand, overall diversity will be increased. The greatest expected changes will occur to the streamside ecotone dominated by gums, beech, river birch, sycamore, tulip tree, and several species of oaks, where natural succession has been left undisturbed by man for a few decades.

When deciduous trees with trunks and foliage extending over a few meters in height are removed from the right-of-way, suitable habitat for several species of warblers and woodpeckers who feed largely within the middle and upper-story forest layers will be reduced. Birds who originally feed within the cleared area will be forced to move their feeding areas to adjacent suitable territory or to remain and utilize the food associated with low-growing shrubs and grasses. While attempting to move their feeding areas, these birds will be forced into competition with nearby established members of the same species occupying and feeding in the same ecological niche. If they attempt to keep the same geographical location for their feeding area, they will have to compete with other species of birds who will move in and who are already fully adapted to utilizing the food produced by a low-growing shrub and grass community. In either case the displaced bird is at a great disadvantage.

It is commonly believed that destruction of an area's wildlife habitat will result in a movement of the displaced animals into suitable surrounding areas not directly affected by the given project. This is a partially true but grossly misleading belief. If an adjacent similar habitat is acceptable, it usually is already saturated to its carrying capacity with a population of the same or closely competing species. When this is the case, ingress of additional individuals will result in a population size and resultant density above the supporting capabilities of the remaining habitat. The net result will be the death of the excess population least able to obtain food and shelter, almost all of whom will be those animals who have been displaced from their home range.

Conversely, those species, such as sparrows, mourning doves and the like, who are adapted to making maximum utilization of food produced by annuals, grasses, and low shrubs, will benefit from an opening up of the forest canopy.

On the ground, population shifts in the small mammals will occur as species of insectivores (shrews, moles), mice, rats and voles, adapted for life on the forest floor, are replaced by species adapted for life in a more open environment. These changes will also influence the local population of raptorial birds (hawks and owls) who prey on these animals. The primary food supply for the gray squirrel will also be removed when the trees are cut, although it probably will be a visitor to the area after the ground cover has regrown.

Larger and wider-roaming mammals, such as the raccoon and opossum, will be less affected by the right-of-way clearing due to their adaptability and omnivorous feeding habits. One large mammal, the beaver, which occurs in the area, is adapted to making a home in the nearby stream and feeding upon the succulent portions of streamside woody and semi-woody vegetation. They, and other semi-aquatic mammals, such as the otter and mink, usually move away from sites extensively visited by humans. Their continuing presence will depend upon the relative increase in human use of the cleared right-of-way.

The aquatic communities in Crabtree Creek may be altered as well. If additional clay, silt, and sand enter Crabtree Creek as a result of streamside construction, the primary productivity of the green plants in the stream will be reduced to the extent they are excessively shaded from the sun by the suspended and deposited particules. Of course, where construction is so close to the stream that a portion of the tree canopy formerly shading the stream is removed, available sunlight at the water's surface would go up, counterbalancing to some extent the former effect. If the vegetative canopy along the creekbank is cut away, increased diurnal variations in water temperatures will also result. During the day, due to increased direct solar radiation, temperatures will increase; in the evening, decreased vegetative insulation will allow greater heat loss and an associated lowering of temperature. These temperature alterations may affect spawning and fry survival.

The texture of a stream bottom influences the species mix of benthos living on and in it. A rocky bottom will support one set of species on it while pebblely, sandy, silty, and clay bottoms will have different faunal associations. An increased layering of the smaller particules likely to wash off construction sites onto the larger rocks and pebbles usually found in undisturbed piedmont streams will cause a loss of available habitat for some life forms such as caddis flies and an increase in suitable substrata for forms such as aquatic worms. This will affect the species diversity and population of game and other fish which feed on these types of organisms.

4. Growth and Development Impacts

There will be major impacts from the proposed project on land use and development. Adequate sewerage will allow development to occur faster than might otherwise be expected. The proposed interceptor is designed to serve a population of at least 80,000 persons, 70,000 of which may be expected to reside west of a north-south line through Umstead State Park. Proposed densities vary from five to greater than nine persons per gross acre (gross meaning total land area, including residential dwellings, streets, commercial enterprises, schools, floodplains, open space, etc.). The net densities of some areas may be somewhat higher.

Densities without the interceptor could be expected to be lower. Should package plants discharging to Crabtree Creek be built, localized growth around these plants could be expected, but a limited number of persons could be served. The Wake County Plan of Action Resolution states maximum capacity of Crabtree Creek and its tributaries to be the wastewater generated from 3,000 persons. This quantity would still, under low flow conditions, provide only one part natural flow to three parts treated sewage flow. The use of septic tanks might therefore be expected. Lot sizes of 40,000-60,000 square feet have been required by the Public Health Department in this area which would cut maximum gross densities to between three to five persons per acre. Minimum allowable lot sizes have been set at 30,000 square feet where a public water supply source is not available and 20,000 square feet where water is supplied. Even at this lower figure, maximum net densities would be approximately seven persons per acre.

Presently, there is no comprehensive land use plan for the Upper Crabtree Basin; however, the Wake County Planning Department is working on such a plan. It is therefore impossible to compare the design flows of the various segments of the interceptor with approved county plans. The rate and density of residential developments may be set by individual zoning requests.

The rate of development, type of land use, and population density all have significant impacts on both local watercourses and their surrounding areas. The higher the density, the greater the amounts of impervious surfaces and runoff, and the more significant the impact on streams. The higher the density, the greater the impact on transportation, community services, recreational facilities, commercial establishments, and practically all other urban activities. These impacts are discussed in the following section, Secondary Impacts.

B. Secondary Impacts

Secondary impacts are those changes resulting from a direct or primary impact of a project. Often, secondary impacts are impacts that are already occurring or may occur with or without the project interceptor. EPA participation in funding the Crabtree Creek interceptor sewer will result in increased severity of certain environmental problems. This interceptor will increase the amount and speed of urbanization in the Upper Crabtree Watershed and will cause aggravation of certain impacts of development.

1. Stream Flow

Development of a rural watershed has been repeatedly shown to have significant effects on stream flow characteristics. Urbanization can double or triple flood magnitudes in the Piedmont North Carolina area (Putnam, 1972). This increase can be attributed to (1) increases in impervious surfaces causing a decrease in infiltration and, therefore, an increase in the volume of runoff, and (2) hydraulic changes of the basin decreasing the time necessary for the rainfall to reach the watercourse.

The volume of runoff is governed primarily by infiltration characteristics and is related to the percentage of impervious surfaces, slope, soil type and vegetative cover. Urbanization includes the construction of roofs, parking lots, and streets which significantly increases the impervious surfaces and decreases the surface available for infiltration to groundwater. Typical urbanization of a rural area may increase the percentage of impervious surfaces from practically zero to 30 percent or more. The associated loss of vegetative cover decreases the rainfall intercepted and retained on foliage. The net result is a significant increase in the volume of runoff.

Urbanization likewise reduces lag time, the average time necessary to move storm water across land surfaces to the stream channel (Figure 18). Sewers, gutters, and paved surfaces allow storm waters to flow unimpeded and reduce the lag time. This reduction can greatly increase the flood stage in a receiving stream. When a particular volume of water falls on an area, if the time for this water to reach the stream channel decreases, the rate of discharge in the stream must increase. This increase in discharge results in a higher stage and increased flooding.

The combination of increased volume and decreased lag time can have drastic effects on downstream areas. Figure 19 shows some typical ratios for storm water discharges after urbanization vs. discharges before urbanization. For example, if an area becomes urbanized such that 20 percent of the area is impervious and only 40 percent is sewered by storm sewers, the peak discharge will be twice as much after urbanization as before. The graph is not specific for Crabtree Creek, but it illustrates similar greatly increased stream flows in other areas which may be expected in this basin. As may be readily seen, increased impervious

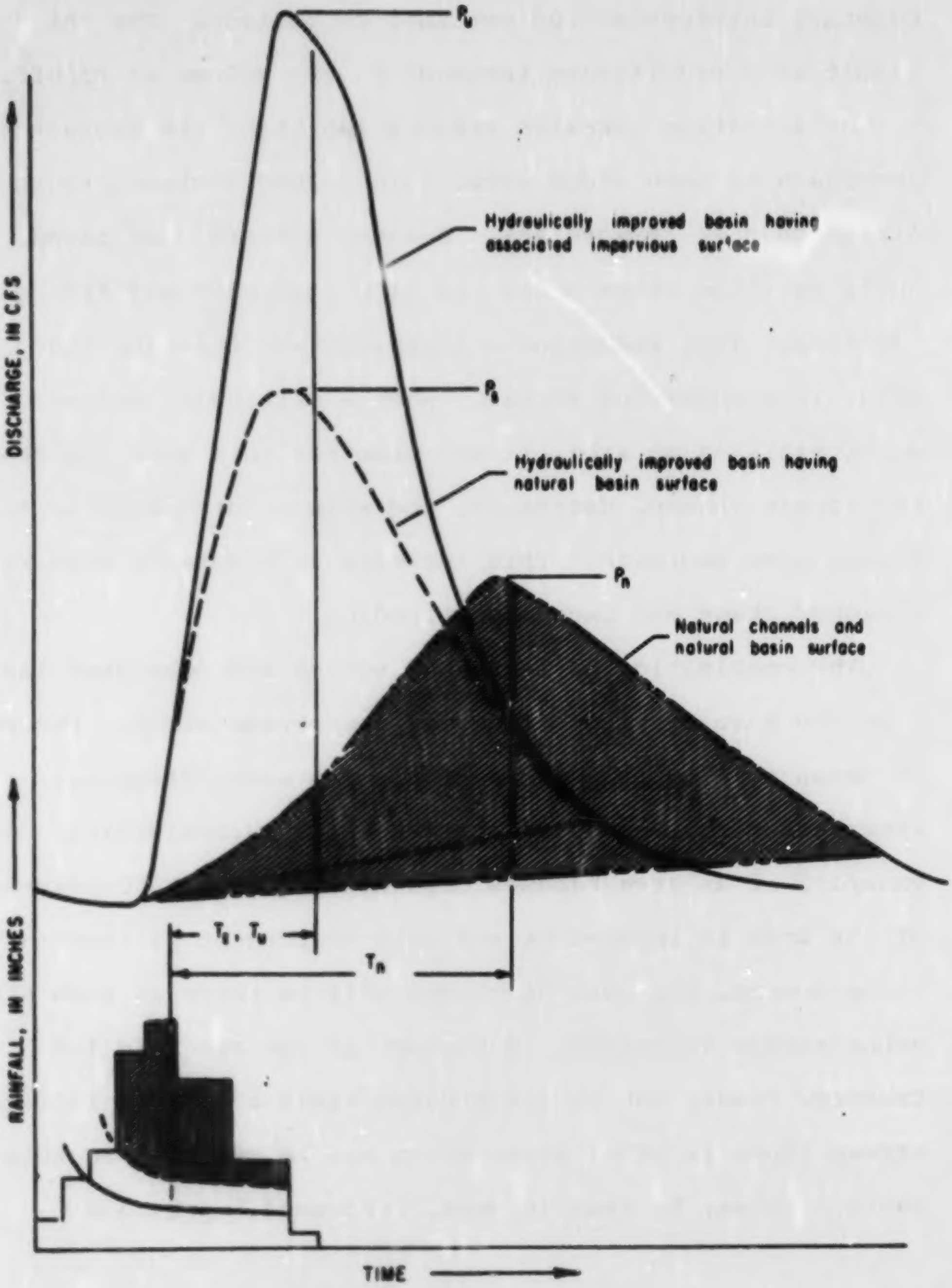


Figure 18--Schematic drawing illustrating the effects of urban development on flood hydrographs. Hydrographs are not to scale. T_n, T_s, and T_u, lag times; P_n, P_s, and P_u flood peaks of the hydrographs for the three basin types shown.

Robert Coughlin and Thomas Hammer, "Stream Quality Preservation Through Planned Urban Development," EPA, May 1973

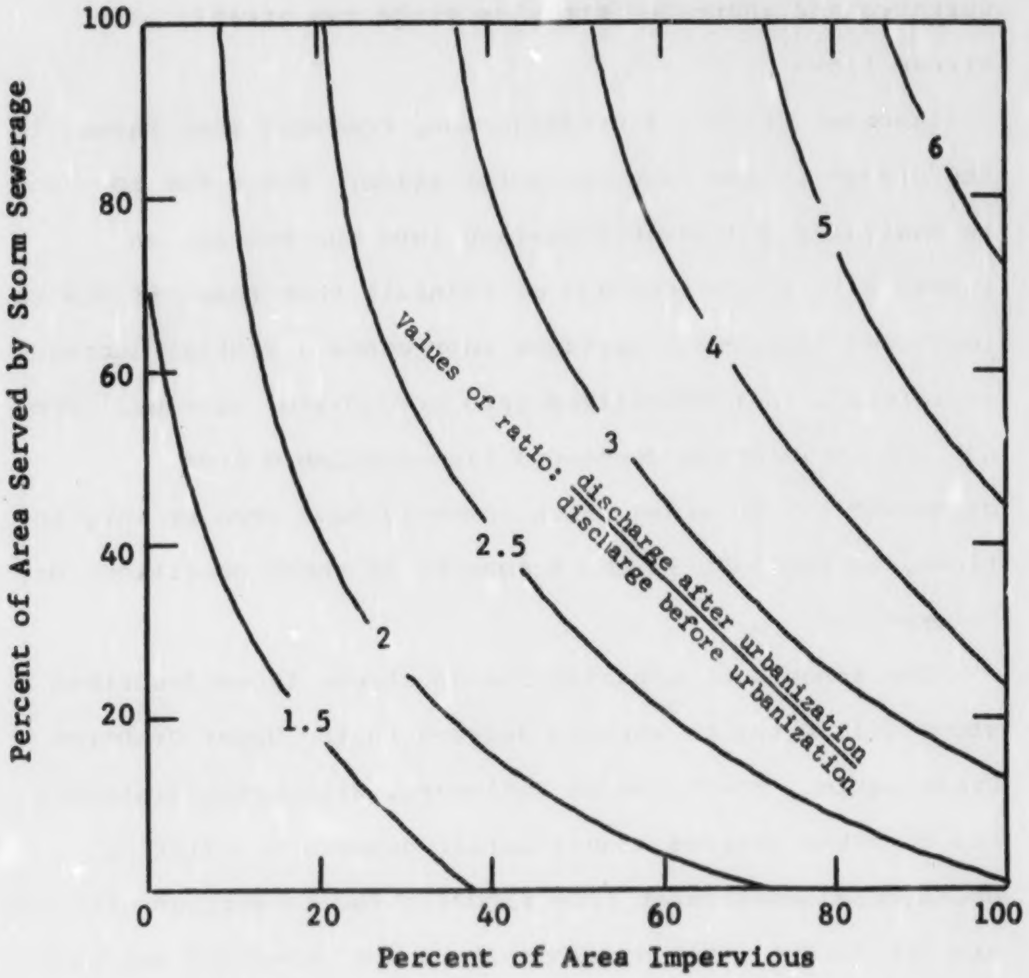


Figure 19

EFFECT OF URBANIZATION ON MEAN ANNUAL FLOOD
FOR A 1-SQUARE-MILE DRAINAGE AREA

Source: Leopold, "Hydrology for Urban Land Planning," U.S. Geological Survey Circular 554, Washingtion, 1968; p. 5.

surfaces and increased storm sewerage can greatly affect stream flows.

Another effect of urbanization, somewhat less known, is the change in low flow characteristics. Since the low flow is basically groundwater seepage into the stream, an increase in the percentage of rainfall that runs off due to increased impervious surfaces represents a similar decrease in rainfall that percolates into groundwater storage. The net result is often decreased flow available from groundwater. In areas which commonly have zero or very low flows, an increase in the frequency of these conditions may be expected.

The impacts of urbanization on stream flows described above will occur to varying degrees in the Upper Crabtree Creek Basin. The Corps of Engineers, Wilmington District, has computed average annual dollar damages to existing downstream development from flooding for conditions with and without future urban development in the watershed and with and without the SCS control structures (Table 10). As may be seen from this table, 80 percent development of the watershed would raise average annual damages to existing development from $933 thousand to $1.9 million if the SCS structures were not built. If the structures are built,

TABLE 10

Average Annual Flood Damages

	Wake Forest Road Farmers Market Area	Crabtree Valley Mall Area	Average Annual Damages
Existing Development Without SCS Structures	$ 501,000 (54%)	$ 276,000 (30%)	$ 933,000
Existing Development With SCS Structures	114,000 (71%)	15,000 (9%)	161,000
80% Development Without SCS Structures	1,029,000 (54%)	560,000 (29%)	1,918,000
80% Development With SCS Structures	219,000 (65%)	42,000 (13%)	335,000

Corps of Engineers' Letter
April 21, 1976

then even with 80 percent development, average annual flood damages are estimated at $335 thousand or about a third the damages under existing conditions without the SCS structures. Table 10 also shows the increase in average annual downstream flood damages, caused by 80 percent development, is less with the SCS structures than without them. The flood stages associated with the varying conditions are given in Figure 16. This figure shows flood stages for a 100-year storm of approximately two and one-half feet greater than present stages due to 80 percent urbanization of the Crabtree Basin without the SCS structures. Flood stages with 80 percent development of the Upper Crabtree Basin with the structures are shown to be three to four feet lower than with existing development without the SCS structures.

The actual damages incurred and other adverse impacts will depend on the measures taken to mitigate these impacts. Chapter IV presents a discussion of available mitigative measures.

2. Erosion and Sedimentation

Development of a watershed can increase the amount of erosion and the resultant sedimentation in two ways. First, runoff from construction sites that have been stripped of vegetation carry large quantities of silt into the waterways. Secondly, an increase in runoff causes increased erosion of the channel banks. These two sources can greatly increase the total sediment loading on a receiving stream.

Piedmont lands have been estimated by Wolman (1964) to produce sediment yields of 500 tons per square mile per year. Sediment yields from urbanizing areas have ranged from 1,000 to more than 100,000 tons/square mile/year. Other researchers (Guy and Ferguson, 1962; Keller, 1962; Wark and Keller, 1963) have estimated that urbanization increased sediment yields from four to 250 times that of rural areas. Additionally, the increase in sediment production through erosion of channel banks due to increased peak flows has been estimated as high as five times the usual production from a non-urban area.

Uncontrolled development of the Upper Crabtree Creek Basin can be expected to significantly increase the production of sediment as described. The highly erodable Creedmore-White Store, Cecil-Appling and Cecil association soils, which predominate in the upper basin, make the erosion potential more serious. The adverse impacts associated with erosion and sedimentation that are described in the primary impacts section will also occur from this secondary source. Aquatic fauna and flora growth will be inhibited, and flood stages may rise due to deposition of sediment in the stream bed.

3. Water Quality

There can be little doubt that as a watershed becomes urbanized, the quality of its surface water decreases. As discussed previously, the sediment loading increases due to construction runoff and stream bank erosion. Following construction, materials found on street surfaces wash into adjacent surface waters, causing urban runoff in many respects to be similar to sanitary sewage.

Street surface contaminants are comprised primarily of particulate matter but also include soluble and suspended matter. These constituents come from the degradation of asphaltic and concrete pavements, various contributions from motor vehicles (e.g., leakage of fuel, lubricants and fluids; particulates from tires, clutches and brakes; dirt and rust; and components from wrecked vehicles), fallout from the atmosphere, vegetation (e.g., leaves, branches), litter, spills, and other sources. In some areas lawn fertilization may also become a significant contributor to urban runoff pollution. Particular land uses dictate which of the above sources are significant in any individual urban area.

Constituents of urban runoff may lower the dissolved oxygen content of receiving waters by adding oxygen-demanding materials to the stream. A low oxygen content can result in oxygen starvation for fish and, in extreme cases, production of noxious odors. One measurement of the ability of a waste to deplete waters of oxygen is the biochemical oxygen demand (BOD). The BOD is measured by determining the amount of oxygen necessary for the biological degradation of a waste for a specified length of time, usually five days.

The BOD contribution has been evaluated by various researchers in terms of pounds per curb mile (lbs/curb mile) found on street surfaces. Values for BOD contributed to watercourses per storm have been reported as low as 0.8 lbs/curb mile (Water Pollution Aspects of Urban Runoff, 1969). Following dry periods with continued buildup of pollutants, values as high as 50 lbs/curb mile (Water Pollution Aspects of Street Surface Contaminants, 1972) have been reported. BOD values between five and 20 lbs/curb mile are typical in urban residential areas. During the first minutes of rainfall, the discharge of these pollutants occurs rapidly, and concentrations of oxygen-demanding material can reach significant proportions. In cases of low stream flow with a light rainfall, very high concentrations of oxygen demanding materials (BOD) in the receiving waters may occur. Should this low flow condition persist, continued oxygen utilization may result in low or zero dissolved oxygen concentrations, killing aquatic aerobic organisms.

Other pollutants which can cause adverse impacts are nutrients (phosphates, nitrates, and ammonium nitrogen), heavy metals (zinc, copper, lead, nickel, mercury, chromium, etc.) and various pesticides. An abundant supply of the nutrients necessary for growth can result in algal blooms. During daylight hours, photosynthesis by these algal organisms may raise dissolved oxygen concentrations above the saturation level. But during the nightime hours, algal respiration can reduce oxygen concentrations to very low levels. Death and settling of these organisms can contribute significantly to the benthic (bottom) oxygen demand of the water. Unsightly conditions, odors, and fish kills may be the ultimate result of this over-enrichment.

Heavy metals and pesticides concentrations may also affect the ecological balance. With high levels, they can become toxic to certain aquatic organisms, changing or destroying the naturally occurring trophic (feeding) structures. For example, a certain fish may be able to survive a certain concentration of a toxicant, but the organisms that the fish uses as a food source may not be able to survive. Species diversification is often reduced, with only a few tolerant species flourishing. Lower levels of these toxicants can cause chronic effects on organisms; changes in activity levels, reproduction rates, etc.

Following urbanization of the Upper Crabtree Creek Watershed, storm water runoff will contribute to the pollutant loadings, and the water quality of Crabtree Creek may be expected to deterioriate. Control measures exist and are discussed in Chapter V.

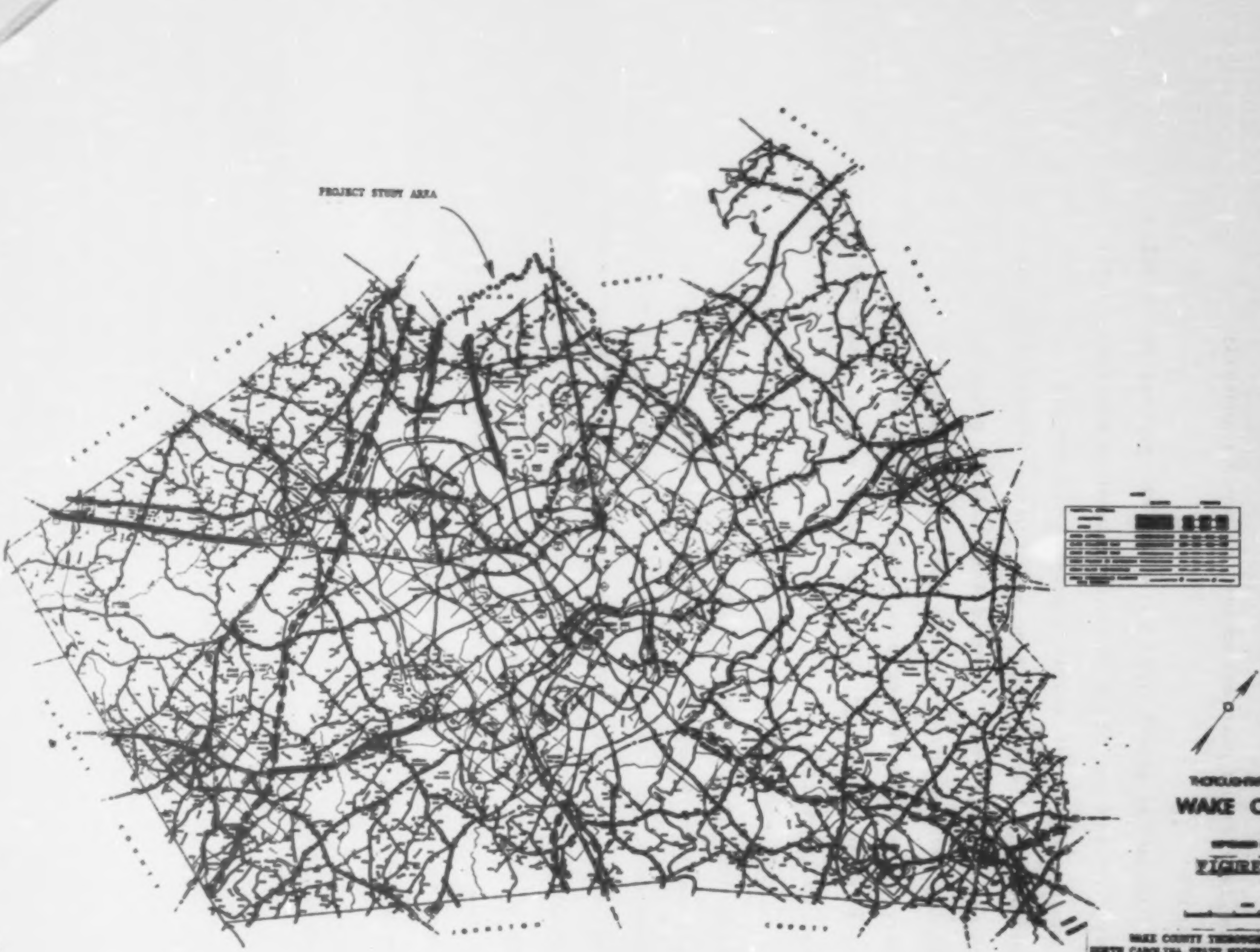
4. Community Services and Utilities

With increased development comes the necessity of providing community services such as water supply, transportation, power, recreation, schools, health facilities, fire and police protection and garbage pickup. Each of these services is provided to the general public through taxation, special assessments, or service charges. Since each involves an expenditure of natural and economic resources, impacts are involved.

Most of the water supply needs of the city of Raleigh and the surrounding area are presently satisfied with water originating from the Neuse River. Future plans project raw water supplies from the Falls of the Neuse Reservoir. This reservoir is presently under construction. Construction of the proposed interceptor sewer commits the raw water resources of the Neuse to satisfying the water supply needs of approximately 80,000 persons (10 mgd at 125 gpcd).

Similarly, land and economic resources must be committed toward supplying the projected population with roadways and/or mass transit facilities. Present plans provide for a system of arterial roadways connecting the project area to State Highway 54, I-40, Duraleigh Road (1664) and Highway 70. (See Figure 20.) Urbanization of the Upper Crabtree Creek Basin may be expected to significantly increase the volume of traffic using these corridors.

The possibility of mass transit for the Triangle area has not been intensively researched, existing rail lines from Raleigh to most major populated areas (Durham, Research Triangle, Cary, Wake Forest, Wendell, Zebulon, Garner, and Fuquay-Varina) suggests the possibility of such a system. The incorporation of plans for mass transit facilities into the Wake County Master Transportation Plan needs to be given



THOROUGHFARE PLAN

WAKE COUNTY

FIGURE 20

WAKE COUNTY THOROUGHFARE PLAN
NORTH CAROLINA STATE HIGHWAY COMMISSION
DECEMBER 1972

future consideration to assure this option remains open should population densities increase sufficiently to make these facilities cost effective and environmentally desirable.

Population growth also increases the generation of solid wastes. Land use plans being developed by the Wake County Planning Department should consider and specify the appropriate ultimate fate of solid waste generated by the proposed population. Planned land filling prior to development can often provide much needed land for recreational purposes or open space. By planning the location of a landfill area, the potential for reuse may be more fully utilized.

In addition to these required services, the increased power demands necessary to satisfy a population of 80,000 will need to be supplied. Assuming approximately 27,000 residences, approximately 135 MVA of electric power will be required. Utilities such as water and sewage and commercial establishments within the area would require another 135 MVA giving a total estimated demand for the area of 270 MVA. At the present time, the following distribution substations serve the area of the Crabtree Creek Basin: 1) Prison Farm substation located to the north of the Raleigh beltline and east of Interstate 40, 2) the Cary Substation located in Cary, 3) the Raleigh-Durham Airport Substation located just north of S.R. 1002 and northeast of the airport, 4) the Leesville Substation located to the east of Highway 70, and 5) the Oak Park subdivision substation. Each of these substations has a present capacity or can be expanded to 100 MVA. Future plans call for the establishment of stations in Cary, Morrisville, and to the west of the present Crabtree Valley Shopping Center, each of which will have an ultimate capacity of 100 MVA. In addition, there are plans to install a 500/230 KV bulk power substation to the north of the Raleigh-Durham Airport. This power demand may initially require additional burning of fossil fuels. The Shearon Harris Nuclear facility, when completed, will provide further generation capacity (Correspondence, Earl F. Stephenson, Carolina Power and Light, April 12, 1974).

Schools and recreational areas also will be needed. The usage of Umstead State Park may be expected to rise considerably due to the increased proximity of residential areas. Additional facilities will be required to accomodate this use, i.e., parking, trails, picnic areas, etc. Plans are being developed by the State Parks Department to provide the additional facilities and allow for usage and preservation of the ecological integrity of this park area. The Capital City Greenway Plan is one of these proposals (Appendix 16). Although EPA can take no active role in funding such a project, this Agency does favor multiple use of interceptor right-of-way for such purposes. Also, the New Falls of the Neuse Reservoir will provide additional recreational facilities for the Wake County area.

The need for comprehensive planning in this watershed is great. Haphazard growth, which is indifferent to areawide planning objectives and stimulated by available utilities, could have a marked impact on the future quality of life for persons in this watershed area and on existing usage of downstream areas. The Areawide Plan, Wake County Land Use Plan, and a coordinated effort between Raleigh, Cary, Morrisville, and Wake County offer great possibilities to avoid foreseeable developmental problems.

5. Air Quality Assessment

Wake County, which is part of the Eastern Piedmont AQCR, is classified as follows:

Pollutant	Priority Classification
SO2	III
Part	I
Ox	III
CO	III
NO2	III

Since a priority classification of III indicates pollutant concentrations below the natural Ambient Air Quality Standards, particulates become the major concern. Particulates, which have a significant effect on air quality, come from large point sources greater than 100 tons per year. Because necessary dust control measures will be used, the construction of the interceptor sewer would be considered a very small overall source of particulate air pollution. Electrical power for this project will come from an existent coal fired plant for the interim. The coal-fired plant is presently being controlled by State regulations.

When housing projects begin to develop in and around the interceptor sewer, electrical power is to be furnished by a new nuclear power plant. Nuclear power does not emit significant amounts of particulates. The small amount emitted would come from emergency diesel generators which have no significant impact upon air quality. There will only be slight emissions of sulfur dioxides from the emergency diesel generators and none from the nuclear power station. Therefore, there are no significant impacts expected by the construction of this project on air quality.

Pollutants emitted from automobiles are classified priority III and do not violate the ambient standards, although automotive traffic contributes to increasing the amount of particulates in the air by stirring up materials located on roadways.

To assure that the ambient air quality standards are not violated at some future date, EPA has developed Indirect Source Regulations. The regulations require that an assessment be made of the effect of a project classified as an indirect source. An indirect source is one that does not emit pollutants itself, but one which would create an air pollution problem by inducing mobile source activity such as with parking facilities, shopping centers, and housing developments. Each State was given the option to develop their own Indirect Source Regulations. North Carolina is one State that did. These regulations have also been approved by EPA. During the development of these regulations, certain size cut-offs were set for various types of projects. Projects which are above these sizes would be required to obtain a permit to construct. These cut-off sizes were set very conservatively to protect air quality. After comparing the size of this project with the criteria, we conclude that it does not qualify as an Indirect Source under State regulations.

The regulation adopted by the State of North Carolina and approved by EPA applicable to this project are Regulation No. 9.1(b). This section deals with population densities and requires an air quality assessment if the population density is greater than, or equal to, 12 persons per acre. Since the projected density for this project is 7.4 persons per acre, no assessment is necessary. This project should not cause a violation of the NAAQS nor should its potential growth.

V. ADVERSE IMPACTS WHICH CANNOT BE AVOIDED AND MITIGATIVE MEASURES

In all construction projects, certain impacts are unavoidable and represent an irreparable loss of a resource. However, with many of these impacts, actions can be taken to reduce considerably the severity of the adverse effects. This section lists those adverse impacts that cannot be avoided and discusses the measures that may be taken to mitigate them. In many cases, the measures necessary to alleviate a problem are not within the jurisdiction of the Environmental Protection Agency or the North Carolina Department of Natural and Economic Resources.

A. Adverse Impacts Which Cannot Be Avoided

Adverse impacts that cannot be avoided are listed below. These impacts were discussed in Chapter IV.

1. Primary Impacts
    a. Wastewater and sludge disposal
    b. Erosion and sedimentation from the interceptor construction
    c. Archeological, historical, and cultural impacts
    d. SCS flood control structures
    e. Aesthetic losses

f. Disruption of ecological systems

2. Secondary Impacts

a. Changes to flood stages and low flows

b. Erosion and sedimentation from developmental activity

c. Changes in water quality

d. Demand for community services and resources

B. Mitigative Measures to Adverse Primary Impacts

Although the preceeding impacts cannot be totally avoided, there are measures that can be taken to reduce the adverse effects. These measures are discussed in the following sections.

1. Wastewater and Sludge Disposal

Discharge of the treated wastewater from the Neuse River Sewage Treatment Plant generated in the Upper Crabtree Basin will contribute to the pollutant loading on the Neuse River below Raleigh. As discussed previously, the Neuse River Sewage Treatment Plant is designed to reduce BOD and SS concentrations in the effluent to 6 mg/l and 5 ppm, respectively. At ultimate design flow, 100 mgd, this plant will allow maintenance of fish and wildlife water quality standards. The Falls of the Neuse Reservoir would allow an even greater dilution capacity since low flows will be controlled.

Sludge disposal will be accomplished by landfill adjacent to the sewage treatment facility. A program has been proposed to study the effects of recycling this sludge on North Carolina State University farm lands. Results from this study may indicate a means for recycling this potential resource.

2. Erosion and Sedimentation

Erosion and sedimentation can be controlled in practically all instances of sewer line construction. Lack of adequate precautions has caused the adverse impacts of the past. By providing a sufficient vegetative buffer between the edge of the right-of-way and the stream bank, the major effects may be mitigated. Special erosion control efforts must be taken for stream crossings, steep banks, and other cases which require the disturbance of the natural stream bank. Timely efforts of revegetation and proper construction techniques can assure maximum protection.

The natural bank of a creek is held in place by the root systems of the vegetation. The ground foliage filters sediment from overland flow and protects the soil from the erosive energy of rain. Whenever this vegetation is appreciably disturbed, high stream flows, overland flows, and rainfall can erode the unprotected soil. To avoid this condition a minimum natural buffer of at least 10 meters (33 feet) between the edge of the construction right-of-way and the stream bank should be provided to protect the vegetation on the creek edges. A 10 meter (33 foot) buffer will ensure that the roots of the large trees on the bank will not be appreciably disturbed. Many mature species of trees have a root spread of up to 10 meters in radius. Also, trees on creek banks often extend root systems appreciably further upland for support. Root damage from construction vehicles may damage or kill some particularly sensitive species of trees in the buffer zone, e.g., beech, tulipwood, loblolly pine, but major vegetative losses will be avoided.

In those rare areas where this setback cannot be provided, special erosion control techniques should be used. Riprap can be used to protect exposed banks with steep slopes or temporary measures, such as chemical soil binders or nettings, until a vegetative cover is provided. Techniques and available materials are presented in the Environmental Technology Series publication "Guidelines for Erosion and Sediment Control Planning and Implementation" and the Office of Water Programs Operations publication

"Comparative Costs of Erosion and Sediment Control, Construction Activities."

By utilizing proper construction techniques and prompt revegetation, the remaining dangers of erosion may be avoided. The stockpile of excavated soil, construction equipment, and heavy traffic should be kept on the upland side (away from the creek) of the ditch to avoid disturbances to the root systems of trees in the buffer zone. This will also minimize disturbed soil available for possible erosion on the creek side of the construction trench. Unnecessary clearing should be avoided, and damage to remaining vegetation should be kept at a minimum. In areas where the property owners do not wish to retain their lumber, all wood should be chipped and placed on the exposed soil immediately following compaction. The chips will provide protection from sheet erosion and will help dissipate the energy of rain. Lumber too large to be chipped should be made available to the public as free firewood.

Revegetation should follow placement as soon as practicable, but in no case should soil remain exposed longer than 30 days following construction activities on that area. Continuous revegatation presents the most desirable condition, although practicality limitations may dictate revegetation in segments.

The State of North Carolina, in the Sedimentation Pollution Control Act of 1973, has presented mandatory standards for land disturbing activity which are similar to the above recommendations. These standards are listed below:

(a) No land disturbing activity shall be permitted in proximity to a lake or natural watercourse unless a buffer zone is provided along the margin of the watercourse of sufficient width to confine visible siltation within the twenty-five percent (25%) of the buffer zone nearer the land disturbing activity, provided, that this subsection (a) shall not apply to a land disturbing activity in connection with the construction of facilities to be located on, over, or under a lake or natural watercourse.

(b) No slope may be graded to an angle greater than the angle of repose for saturated soil conditions applicable for the type of soil involved; unless the soil on such slope is retained by some adequate erosion controlling structure or device. In any event, soil left exposed will, within 30 working days of completion of any phase of grading, be planted or otherwise provided with a ground-cover sufficient to restrain erosion.

(c) Whenever land disturbing activity is undertaken on a tract comprising more than one acre, if more than one contiguous acre is uncovered, a ground-cover sufficient to restrain erosion must be planted or other-

> wise provided within 30 working days on that portion of the tract upon which further active construction is not being undertaken, provided, that this subsection (c) shall not apply to cleared land forming the basin of a reservoir later to be inundated.

To insure implementation of the above recommendations, an erosion control plan should be prepared for the project and submitted to North Carolina Sedimentation Control Commission and to EPA for approval before construction begins. Consultation on measures and plans for reduction of soil erosion may be obtained from the SCS where necessary.

3. Archeological Impacts

There are three potentially significant archeological sites endangered by the proposed Crabtree Creek interceptor sewer. (Appendix 14) Prior to construction in those identified areas, their archeological worth will be determined by the North Carolina Department of Cultural Resources. Possible rerouting to avoid the site or removal of artifacts will be investigated in those areas deemed historically significant or particularly unusual. The new right-of-way between Trenton Road and Reedy Creek Road has not been surveyed. An archeological survey must be conducted along this right-of-way prior to the construction of this segment of the project.

4. SCS Flood Control Structures

The proposed interceptor on Richland Creek shall be designed so that construction of the SCS structure 11 is not impaired. This may be accomplished by realignment of the interceptor and/or provision of sealed, bolted down covers, vented above the 100 year flood level. Further, the interceptor should not be aligned where it would be adversely affected by the location or construction of structure 25 on Crabtree Creek below the confluence of Richland Creek. Close coordination should be maintained between the applicant and the SCS to be sure that no siting conflicts develop in areas where the interceptor line runs adjacent to proposed SCS structures.

5. Aesthetic Losses

Odors will be controlled by providing aeration of the wastewater at the proposed pumping station. This will be accomplished by locating an aerator in the wet well or by other appropriate methods. Plans and specifications shall include the facilities prior to final approval. It is recommended that venting of the proposed interceptor be accomplished by either utilizing a snorkel device or by placing a vent pipe underground up to the 100 year flood contour. In this manner, the visual impact of the vent may be eliminated.

6. Alterations of Ecosystems

Four criteria for preserving the vegetation in any given area are:

(1) It is aesthetically pleasing and has recreational potential.

(2) It is a rare biotic association, either considered on a local or regional basis.

(3) Its existence is the result of a long successional process and would take a considerable amount of time to become reestablished.

(4) Its preservation will ensure direct economic benefits.

The ecotonal vegetation occupying the streamside water-land interface on much of the project area meets all of the above criteria. A walk through the pathways under a canopy of trees by Crabtree Creek is certainly pleasing. The proposal to extend the Capital City Greenway system along Crabtree Creek and to develop the land around the SCS structure 23 into a recreational area demonstrates its potential.

Stream beds and the narrow strips of associated vegetation occupy only a fraction of one percent of the project area. These bottomland sites in the Piedmont area are continually being impacted by adjacent development or are succumbing to development themselves as local suburban building sites run out. Therefore, these areas are becoming increasingly rare over a wide area as urbanization proceeds.

The presence of large - over 1/2 meter dbh (diameter breast height) - beech trees along the proposed sites in association with other vegetative members of a climax community indicates a long passage of time since early successional stages. As beech trees are relatively intolerant to the widely fluctuating humidities and temperatures found in early seral stages, their recolonization will be postponed. Once beech seedlings have started, several decades are required before trees of the 1/2 meter dbh class are regrown.

Many of the streambanks juxtuposed to the proposed sewer line rights-of-way are vertical in aspect for one to three meters (three to ten feet) immediately adjacent to the flowing water. As the soil itself in these areas does not have a particularly steep angle of repose, it is clear that these vertical banks are being supported by the vegetation clinging to them. Their cover ranges from small liverworts and mosses to over 1/2 meter (18 inches) diameter river birches. The small plants hold the soil grains in place from gravity and the larger tree roots provide protection from erosion by swiftly moving water during periodic floods. Without this root matrix to hold these banks in place, serious slumping into the creek would take place. On Crabtree Creek just below Oak Park a collapse of the creek banks was noticed only six weeks after vegetation was disturbed. A previously emplaced large interceptor sewer line was put in danger of being undermined. Corrective action utilizing backfill and riprap is expensive, time consuming, and wasteful of resources.

Because of its value in reducing the initial construction cost, and in reducing the cost of maintenance through erosion control along these bottomland sewer rights-of-way as discussed in Section V.B.2, a minimum of a 10 meter (33 foot) undisturbed buffer should be left between the right-of-way and the stream's vertical banks whenever practical.

To reduce adverse impacts on Crabtree Creek itself and on the valuable streamside community, line placement will be made at a distance greater than 10 meters whenever a less complex vegetative association such as pasture, open field or a young pine stand is adjacent and its location doesn't pose exceptional slope or grade problems. These type communities represent an earlier stage of ecological succession and their disruption would represent a smaller loss of biotic information and structure.

In order to ascertain the types of cover growing on the proposed sewer rights-of-way, and, therefore whether the line routing should be changed, a vegetative survey was made to determine the frequency of occurrence and basal area of certain species of trees along the proposed right-of-way (Appendix 15). This survey utilized standard statistical biological field sampling methods, such as quadrats, random pairs, line intercept, transects, or a variable-radius plotless method, and describes, in general, the types of natural communities growing within the proposed right-of-way boundaries. A primary vegetative survey was made of 100 meter (328 feet) sections along the right-of-way. Only trees over six inches dbh were sampled.

The area included in each primary 100-meter section was that area within 10 meters (33 feet) on either side of the proposed right-of-way centerline, unless the centerline was closer than 10 meters from the edge of the vertical creek banks in which case the section width ran 20 meters (66 feet) from the edge of the vertical banks.

Whenever it was determined that 60 percent of the trees sampled in any 100 meter long section of right-of-way were either beeches, sweetgums, black gums, sycamores, ironwood, or 1/2 meter (18-inch) dbh and larger oaks, an additional secondary vegetative survey was done.

This secondary survey ran parallel to, and shared a common boundary with, the primary 20-meter-wide survey. It extended 60 meters (200 feet) in depth perpendicular to the primary survey boundary away from the creek bank.

The secondary survey was divided into three parallel strips 20 meters wide and 100 meters long. The three parts were called Secondary A (closest to the primary survey), Secondary B (next furtherest away), and Secondary C (furtherest from the primary survey). Sampling proceeded on the Secondary A, B, and C strips as it was carried out on the primary survey.

Where this secondary survey discloses an area where there are no trees over 1/6 meter (six inches) dbh, or where more than 60 percent of the individuals sampled are species other than those listed above, the survey site is marked on a map as an area of potential alternative routing.

Engineering cost estimates will be made regarding the placement of the sewer line on said alternative route. If these estimates are no larger than 125 percent of the original proposed routing, then a change in line routing to the secondary surveyed site will be made. If any areas are found where an exceptionally unique ecotonal community exists, EPA reserves the option of relocating the interceptor regardless of the cost estimates.

The new right-of-way between Trenton Road and Reedy Creek Road has not been surveyed. A vegetative survey must be conducted along this right-of-way prior to completion of this segment of the project.

Following the determination of the actual route alignment certain measures can be taken to enhance the production of wildlife and to increase the aesthetic quality of the right-of-way. Prompt revegetation with shrubs as well as grasses is recommended. Also, the use of wildlife food-producing perennials would be desirable.

C. Mitigative Measures to Adverse Secondary Impacts

1. Flooding

As discussed in Chapter IV, Impact of the Proposed Project, there is a great potential for increased flooding due to development o. the Upper Crabtree Watershed. The use or non-use of measures to lessen the impact will determine the actual effects on downstream properties. The following are some measures which would mitigate these impacts.

a. Soil Conservation Service Flood Control Project

The SCS has an ongoing program to construct flood control structures in the Upper Crabtree Basin (Chapter II.A.2). Various difficulties have been encountered, with the result that only four of 11 structures have been built, although two others are under construction. The remaining five are stalled, awaiting land acquisition. Two of the these five are considered the major flood control structures of the plan.

The Corps of Engineers flood damage data (Table 10) shows the amount of protection that may be afforded by the construction of these dams. Under the present conditions (existing development without SCS structures), average annual flood damages to existing downstream development are estimated to be $933,000. Completion of the structures would reduce these average annual damages to $772,000, an average annual savings of $161,000. However, an assumed 80 percent development of the watershed after the structures are built would increase average annual damages from

$161,000 to $335,000. This increase is $811,000 less than without the SCS structures. Adherence to land use and impervious surface limitations developed by the Wake County Planning Department will be necessary to assure that the design hydrologic capacities of the proposed control structure will not be surpassed. Coordination of sewer hookups, land use planning, and zoning between Wake County, Cary and Raleigh will be necessary.

Completion of this flood control project is one method whereby the threat of increased flooding may be eliminated. Grant funds shall be withheld from the proposed project until land rights have been acquired for the Soil Conservation Service control structures located downstream of each respective proposed service area, or until other structural and non-structural measures are taken, including, but not limited to, flood protection, flood proofing, urban runoff controls, developmental restrictions, and other land use modifications which will insure an equivalent amount of flood protection as determined by the State of North Carolina, SCS, the COE, and the EPA. Grant funds shall be withdrawn July 1, 1976, from the proposed project if land rights are not acquired for the SCS structures or agreement on other measures to insure adequate flood protection is not reached.

Should the rights to the property for structure 11 (Richland Creek) be acquired, construction of this segment shall proceed to provide service to the State facilities presently at capacity. If the remaining property rights are not obtained and other measures are not agreed upon, the project scope shall be reduced to include only this construction.

b. Floodplain and Floodway Ordinances

For the protection of persons who, knowingly or unknowingly, desire to reside in or utilize floodplain areas, many localities have adopted ordinances to help protect persons and properties from undue damage or injury. The city of Raleigh and Wake County have passed such a floodplain and floodway ordinance. These ordinances are designed to prevent or minimize future development on the flood plain which would otherwise tend to increase average annual flood damages.

The major requirements of the Raleigh ordinance are as follows:

(A) Building Permits shall be required for all proposed new construction and for all major repairs to existing construction within the floodplain area.

(B) Before a building permit shall be issued for any new construction or substantial improvements within the floodway fringe area, the plans for the proposed construction (including prefabricated and mobile homes) shall indicate that said construction:

(1) will be protected against flood damage,

(2) is designed or will be modified and anchored to prevent the flotation collapse or lateral movement of the structure,

(3) will involve the use of materials and utility equipment which are resistent to flood damage,

(4) will involve the use of construction methods and practices which will minimize flood damage.

(C) Before a building permit shall be issued for any major repairs within the floodway fringe area, the plans for the proposed repairs shall demonstrate that said repairs:

(1) will involve the use of construction materials and utility equipment which are resistant to flood damage.

(2) will involve the use of construction methods and practices that will minimize flood damage.

(D) Any and all new construction or substantial improvements of residential structures within the floodway fringe area shall have the lowest floor (included basement) elevated to or above the level of the 100-year flood.

(E) Any and all new construction or substantial

> improvements of non-residential structures within the flood plain area shall have the lowest floor (including basement) elevated to or above the level of the 100-year flood; or together with attendant utility and sanitary facilities shall be floodproofed up to the level of the 100-year flood.

The ordinance passed on June 3, 1974 by the Wake County Commissioners is similar to the Raleigh ordinance. Its purpose and intent is as follows:

> "...to declare that certain areas of the County shall be designated as floodways and floodway fringes; and to help control and minimize the extent of floods by preventing obstructions which inhibit water flow and increase flood height and damage, and thereby to prevent or minimize loss of life, injuries, property damage, and other losses, both public and private, in flood hazard areas, and to promote the public health, safety, and welfare of the citizens."

Generally, any use having low flow obstructing characteristics shall be permitted within floodway areas provided the one-hundred year flood level is not increased, and that no equipment or material shall be stored which may be flammable, explosive, toxic or which could otherwise be injurious to human, animal or plant life.

The following requirements must be met to obtain approval of plans and building permits to construct, add to or alter in the floodway fringe areas:

(1) Application for a building permit, accompanied by plans for the proposed development, shall be presented to the Board of Adjustment for review and approval, approval with modification, or rejection.

(2) The plans shall consist of but not be limited to the following:

(a) a general site plan showing the location and type of buildings and structures to be erected, areas to be filled, and the boundaries of the floodway fringe;

(b) cross sections at intervals not exceeding fifty (50) feet, prepared by a registered engineer, landscape architect, or architect showing the regulatory flood protection elevation, boundaries of the floodway and floodway fringe, existing and proposed contours, floor elevations, and a profile of the associated streams; and

(c) such hydrologic calculations as needed and necessary, as well as applicable structural and nonstructural flood proofing measures and soil erosion and sedimentation control plans.

(3) In considering such permit and plans the Board of Adjustment shall consult with the Wake Soil and Water Conservation District, who after receipt and review of the appropriate data related to the request, shall make a recommendation to the Board.

(4) No permit shall be granted:

(a) for a development on one side of a stream which would raise the regulatory flood protection elevation more than one-half (1/2) foot, or for a development on both sides of a stream which would raise the regulatory flood protection elevation more than one (1) foot;

(b) for a development which does not meet the standards of the code, or meet or exceed the technical standards and specifications of the Soil Conservation Service, as adopted by the Wake Soil and Water Conservation District; or

(c) for a development which may result in the pollution of, or injury or drying up of any stream or creek, or otherwise endanger the public health, safety, or general welfare.

(5) A certificate of compliance must be issued by the zoning enforcement officer prior to the utilization of any structure approved as a special use of a floodway fringe area.

The ordinance also affects the placement of water and sewer systems in floodway fringe areas. These systems are to be designed to minimize and eliminate infiltration of floodwaters. This interceptor is designed to minimize this possibility.

There is an interesting relationship between flood plain usage and sewer line construction with regard to the proposed greenway system. Since the proposed interceptor is adjacent to streams in floodplain areas, a multipurpose right-of-way could be utilized to provide many uses for floodplain land while reducing overall individual costs.

Since sewer line right-of-way will require continued maintenance, the greenway system management process could be available to provide this service. Access and usage of the right-of way could be controlled most effectively by patrolling and providing public facilities. Aesthetic values for the right-of-way area may be significantly increased by park landscaping and management. The expected advent of floodplain zoning suggests a public usage of these areas. Utility placement and recreation are two uses that are particularly suited for this purpose.

Implementation of the above Floodplain and Floodway Ordinances will mitigate the effects of flooding under future development conditions in Raleigh and Wake County. Outright purchase of projected downstream flood hazard areas is a possible mitigative measure to increased flood stages.

c. Stormwater Runoff Ordinances

Since urbanization is shown to increase storm water runoff, development plans should include provisions for controlling increases in runoff.

The city of Raleigh has taken such action through their Erosion and Sedimentation Control Ordinance. The city's ordinance provides that:

> After the completion of construction on each land-disturbing site to which this ordinance applies, provisions shall be made, on or off the site, for the impoundment of enough of the natural liquid runoff from the site for a long enough period of time to limit the rate of such runoff leaving the site to that which would result from a two (2) year frequency storm if the site were developed in single family homes at a density of four (4) familes per acre or less and if impoundment were not provided; provided, no impoundment shall be required of runoff from sites developed for residential purposes at a density of four (4) familes per acre or less; provided further, part of the space, including parking areas, otherwise required by law to be left open, may be jointly used to satisfy the impounding requirements herein; provided still further, this standard shall not apply to sites of two (2) acres or less in size unless such site is part of a larger subdivision or other project area which, when fully developed, will generate a more significant amount of runoff.
>
> All calculations and plans for impoundment structures and areas must receive the approval of the Chief Engineer of the City before any building permit may be issued.

Wake County also recently passed such an ordinance which will mitigate the increase in runoff attributable to urbanization. The major provisions of the County Erosion and Sedimentation Control Ordinance regarding urban runoff provide that

> after the completion of construction on each land-disturbing site to which this ordinance applies, provisions shall be made, on or off the site, for the impoundment, during storms, of that quantity of the natural liquid runoff from the site which is equal to the calculated difference between the amount of runoff which would result from a two (2) year frequency storm on that land if it were zoned and developec for residential purposes at a density no greater than four (4) families per acre and that which would result from a storm of the same frequency on the same land if developed to the degree for which it is actually zoned; provided, no impoundment shall be required of runoff from sites developed for residential purposes at a density of four (4) families per acre of rless; provided further, part of the space, including parking space, otherwise required by law to be left often, may be jointly used to satisfy the impounding requirements herein; provided still further, this standard shall not apply to sites of five (5) acres or less in size unless such site is part of a larger subdivision or other project area which, when fully developed, will generate a more significant amount of runoff. All calculations and plans for impoundment structures and areas must receive the approval of the Wake County Department of Natural Resources before any building permit may be issued.

As with the erosion control program, coordination between city and county could simplify operation and provide uniform control management.

The combination of urban runoff controls with construction of the SCS flood control structures represents the best solution for mitigating the impact of development in the Upper Crabtree Watershed on flooding. Since an urban runoff ordinance has been passed, some of the increased damages estimated by the Corps of Engineers due to future upstream development with the structures as compared to existing upstream development with the structures may be avoided.

d. Downstream Flood Protection Measures

The Corps of Engineers (COE) is investigating alternatives to control the remaining flood problem along Crabtree Creek from SCS structure No. 25 to the Neuse River (Chapter II). This study will provide the necessary information on the costs and benefits attributable to various non-structural and structural measures (Appendix 6) and the environmental and social impacts of each. From this analysis a recommended plan will be selected to provide additional flood protection.

2. Erosion and Sedimentation

Chapter IV discusses the impact of construction of a sewer interceptor in an undeveloped area on erosion and sedimentation. Without the provision of control measures, there would be greatly increased top soil loss from developmental construction sites and deposition in downstream waterways. Various structural and vegetative measures exist to control sediment production, and enactment of an erosion and sedimentation control ordinance is a means for assuring uniform control standards and adequate protection for downstream areas.

The State of North Carolina has initiated a program for erosion and sedimentation control (Chapter II and IV). In this endeavor, the State is to provide rules and regulations for preventing excessive sedimentation by March 1975. The proposed regulations are similar to those enacted by the city of Raleigh (Chapter II). The State plan will require individual governmental bodies, i.e., region, county, or city, to enforce uniform sedimentation ordinances. Erosion control plans must be prepared for developments over a specified size and approved by local and State agencies.

The Wake County government has passed an erosion and sedimentation bill, which provides that it is unlawful to conduct any land disturbing activity without first obtaining a permit from the county. Agricultural activity, forest production and harvesting, mining activities and any land disturbing activities at any one time, on any one tract, by any person that do not not exceed one acre in surface area are excluded from this requirement. In order to obtain a permit, a soil erosion and sedimentation control plan must be submitted to and approved by the county. Further, before approval of an application for building construction, a certificate of preliminary erosion control compliance indicating that initial soil erosion and sedimentation controls as specified on the approved plan have been installed must have been given by the county. Implementation of this control program before construction in the Upper Crabtree Watershed begins is considered imperative to avoid unnecessary soil erosion and deposition.

Some sedimentation control benefits will also be realized by the construction of the SCS flood control structures. These structures are designed to include a total of 6,266 acre-feet for sediment. A reduction in sediment production reaching the sediment ponds by on-site control will allow retention of the aesthetic qualities of a permanent pool behind these structures. Proposed recreational uses of the control structures will be greatly enhanced by reduced sedimentation.

3. Water Quality

Urbanization of a watershed often signals an increase in the contribution of pollutants to watercourses from runoff. This byproduct of development has just recently been generally recognized as a significant contributor to pollutant loadings. Chapter IV discusses sources of pollutants and general impacts. Fortunately, methods are available to lessen the impact of this non-point source of contaminants

The completion of the SCS control structures will have a marked beneficial effect on the downstream water quality. Particulate material suspended in solution will settle out in the sediment ponds behind these structures. Since approximately 75 percent of the BOD in an urban runoff sample has been shown (Water Pollution Aspects of Street Surface Contaminants, 1972) to be associated with particles larger than 43 u (microns), most of the biological oxygen demanding material would be deposited in the sediment pools, or in the upstream channels.

Nutrients, heavy metals, and pesticides are, to a lesser extent, also removed by settling. A large portion of these pollutants are adsorbed, adhering to, or complexed with particulate matter. The extent of their disolution from the sediments back into the water is not well defined, and future benthic demands associated with the deposition of these particulates are likewise unknown. Onsite urban runoff control measures, as discussed in the chapter under stormwater runoff ordinances (Chapter I.C), would reduce the contributions of pollutants to the SCS sediment ponds. The capture of the first flush of urban runoff from a rainfall event can significantly reduce the benthic pollution contribution to the SCS sediment ponds. The Wake County Soil and Erosion Control Ordinance provides that after completion of construction on each land-disturbing site of five acres or larger, to which this ordinance applies, provisions shall be made on or off the site, for the impoundment, during storms, of that quantity of the natural liquid runoff from the site which is equal to the calculated difference between the runoff which would result from a two year frequency storm on that land if it were zoned and developed for residential purposes at a density no greater than four familes per acre. Runoff may be captured in many ways, but by designing control structures to retain the initial flush for sufficient time to allow for sedimentation of the larger particulates, a significant amount of the pollutants contributed to watercourses by urban runoff may be contained on the sites where they are generated.

An additional or alternative measure may be taken. Provision for sheet flow of the initial flush of runoff across a vegetated area would allow for deposition of particulates and percolation of the most concentrated polluted runoff waters. In this manner the ion exchange and filtering capacity of the soil may be utilized.

This may be accomplished, partially by not installing curbs and storm sewers, unless hydraulicly necessary. In this manner, as mentioned above, the runoff generated on these surfaces will experience overland flow and major pollutant reductions may be accomplished through vegetative filtration and percolation through soil to the groundwater. In many sections of proposed service areas, curb and guttering may be required because of the topography of the land, since erosion of road shoulders or ponding on private property must be avoided.

The SCS control structures, the implementation of the sedimentation control ordinance, and limited use of storm sewering and curbed streets would appreciably mitigate the impact of urbanization on water quality in downstream channels and future sediment lakes. The above combination of measures provides maximum water quality protection by utilizing the most practicable control methods.

VI. RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Approval of the proposed project has been conditioned on prior assurance of adequate flood control measures. The completion of the Soil Conservation Service's flood control structures as planned will provide this protection. Development of the upper watershed must not be allowed at the expense of further endangering property and lives in downstream areas.

Some owners will gain considerable increases in property values following placement of this interceptor. Persons and companies holding greater than 100 acres in the upper watershed are listed in Table 11.

These persons will realize an increase in property values and a potential decrease in development costs. The benefits may or may not be reflected in the ultimate cost to the buyers. Nevertheless, the ultimate cost to the human environment will be reduced by assuring a maintenance of water quality standards.

The construction of the proposed interceptor has the potential for enhancing of the human environment through provision for a maintenance of long-term environmental

TABLE 11

TAX MAP	PARCEL	PROPERTY OWNERS	ACREAGE
256	8	William J. Martin	361
275	21	Earl T. Jones	179
	24	Ideal Development Corp.	76
	25	" " "	104
276	12	Truman W. Miller	118
	9	" "	31
	16	Joyce Heinyen & Alice Eve	142
277	6	Zelma King	342
278	3	E. G. Spikes	104
295	7	W. V. Roberts	106
298	4	R. A. Isley	106
	6	Ethel Sorrell Blackman	247
	10	S. B. Jones	104
317	7	J. B. Wilkinson	172
	15	Junius Sanders	189
318	6	" "	114
319	9	Airpark Industrial Center	13
	10	" " "	61
	13	" " "	21
	25	" " "	57
320	15	Charles Wray	127
321	3	R. E. Shuffler	105
344	27	City of Raleigh	120
371	16	Vacilios Chiotakis	121
372	17	Jesse Marcom	102
	19	Contiental Can Co. Inc.	100
376	1	Raleigh Memorial Park	135
	7	James Poyner	81
	41	" "	29
400	1	Stella Watkins	173
	9	David Williams	210
427	10	Routh Dixon	111

428	1	Bobby Murray	127
	3	Wilbur L. Combs	165
429	4	E. N. Richards	47
	5	" " "	48
	6	" " "	58
	7	" " "	399
430	19	J. DeWhitte Davis	163
455	10	J. J. & Hazel R. Williams	126
	21	Omer G. & Betty J. Ferrell	4
	22	" " "	52
	23	" " "	48
	24	Willis Smith, Jr.	176
456	20	J. W. York & Westhall Inc.	203
458	1	John D. & Thelma Lynch, et-al	150
	2	E. N. Richards, & R. A.Bryan	301
	4	John D. & Thelma Lynch, et-al	133
460	1	Joe W. Barber & Reid S. Towler	161
485	2	Willie Lee Edwards	101
	5	W. L. Edwards, Heirs	201
486	7	Charles B. Upchurch	100
	8	" " "	40
	9	" " "	88
	5	Southern Pine Mgmt. Co.	104
487	1	J. W. York & Westhall Inc.	422
490	130	Jerry J. Nowell	170
514	1	Cleo S. Baucom	117
	2	William B. Upchurch	100
	3	" " "	87
	4	Randolph D. Mills	200
515	1	Wachovia Bank & Trust	250
	6	John W. & Maggie B. Sears	100
	12	Sidney W. Stone	122

516	1	T. V. Martin	105
	2	Wachovia Bank & Trust	316
520	7	Windsor Park Inc.	130
543	3	Margaret S.Pointer	120
	5	" "	137
	8	R. S. Barker	147
544	7	Jack-Holli Inc.	122
	12	Wachovia Bank & Trust	308
570	1	Thurman J. & Lucille W. Howell	100
571	3	W. J. Booth	195
	9B	" "	.93
	14	Five Inc.	286
	82	" "	103

quality. The provision of regional wastewater collection will allow other environmental factors to be the developmental constraints; e.g., soils, slope, transportation, water supply, etc. Alternatively, development dependent on other wastewater disposal methods, such as package treatment plants, would provide situations for spotty uncoordinated growth.

The project area is located centrally to Raleigh, Durham, and Chapel Hill. Research Triangle Park and the Raleigh-Durham Airport are nearby. Inevitably, human use of this area will increase. This use must be designed to provide maximum long-term desirability by orderly planned development. Provision of recreational facilities, open space, transportation corridors, educational facilities, and commercial centers must be coordinated into a functional community.

Wake County, Cary, and Raleigh, through land zoning, control of water and sewer hookups, and various ordinances, have the necessary tools to coordinate development. Construction of the proposed interceptor stimulates the need for utilizing these managing mechanisms.

VII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The proposed project causes irreversible and irretrievable expenditure of certain labor, material, land, and community resources. The construction process will utilize considerable manpower and will commit approximately 105,000 linear feet of concrete pipe and right-of-way. Development induced by these available utilities will commit service area land resources by systematically reducing the number of alternative uses available. Evolving land use patterns and economic restraints will gradually narrow the options. Further, community resources must be committed to provide the services necessary for establishing and maintaining a functional community.

The design capacities of the interceptor segments allow for densities of seven to nine persons per acre. Even though the placement of this interceptor does not set the future usage, it supports development up to this ultimate capacity. As development proceeds, certain alternative uses of land may be lost. Existing farm, pasture, and open land will experience increasing developmental pressure. Higher land values caused by the availability of utilities will exert great pressure on land owners to either commit their land to usages yielding greater monetary benefits or to sell their property to others who wish to exploit this natural resource. The potential for public acquisition or low density usage will be greatly reduced, following placement.

The project commits the local governmental bodies to provide considerable community services, including transportation corridors, water supply, schools, fire and health protection facilities, and recreational and open space. Plans for providing these resources must be devised to ensure availability of these support services in a timely and cost effective manner.

The proposed project right-of-way presents an opportunity to commit land resources for multiple uses. The Capitol City Greenway concept provides a system whereby a utility corridor may serve as an open and recreational space, a floodplain area, and as a transportation corridor for bicyclists and pedestrians. In order to fully realize the potential of the multiple use, plans for incorporating this system must be made now to ensure minimum costs while maximizing benefits. Increased land prices and potential conflicting developments may preclude implementation of this plan at a later date.

VIII. COMMENTS BY INTERESTED PERSONS, ORGANIZATIONS, FEDERAL, STATE, AND LOCAL AGENCIES AND RESPONSE TO THESE COMMENTS

This chapter summarizes the individual comments made in regard to the Draft EIS. These comments were either presented at the Public Hearing held on March 13, 1975, or were submitted in writing by April 15, 1975. Appendix 11 contains the complete record of the Public Hearing. Appendix 12 contains the written comments.

The summarized comments are categorized and presented by major topic. Following the presentation of all comments related to a particular topic, a response is presented.

1. Comments related to the January 1, 1976 deadline for completion of land acquisitions for flood control structures.

a. Dr. Millard B. Bethel
Wake County Health Department

Potential public health risks necessitate the swift completion of the proposed project. Growth will occur whether the sewer line is constructed or not.

b. Mr. H. A. Smith

Wake County Department of Natural Resources

Wake County is making great progress in obtaining flood control structures. However, it is not feasible to acquire land rights for structure No. 25 before January 1, 1976. Funding of Richland Creek portion of project should proceed if land for structure No. 11 is acquired.

c. Mayor Johnnie H. Robertson (Morrisville)

The benefits to be gained from the project far outweigh the disadvantages. Morrisville has applied for FHA and State grants to construct a water system and these requests are being denied for reasons related to the Crabtree Creek interceptor.

d. James O. Waller

U. S. Army Corps of Engineers

Immediate action to facilitate completion of the SCS structures is imperative to reduce flood problem.

e. Robert E. Giles

Northwest Community Task Force

There should be no cutoff date. The project should be funded whenever the land for all structures is purchased and the SCS signs an agreement that they have appropriated funds. Also, the FEIS should say that the grant shall be withheld from the proposed project until: 1) land rights have been acquired for all the SCS flood control structures; and 2) project agreements on all structures are signed by the county and SCS.

f. Mr. George R. Goodwin, Sr.
Wake County Commissioner

Approve the grant funds for construction of the sewer interceptor line with the following provisions:

(1) That the sewer line be constructed in each subdrainage basin or service area only after land has been acquired for flood-control dams and that grant funds be segmented to accommodate this schedule.

(2) Remove requirement of acquiring land for No. 25 before the Richland Creek segment of the interceptor line is constructed.

(3) Extend time period for acquiring land for Numbers 5-A, 20-A, 23, and 25. Not feasible to accomplish by 1/1/76.

g. Mr. G. Dodge Geoghegan
Raleigh Chamber of Commerce

Feels that acquisition of the land is not realistic and is impossible to accomplish by the termination date. Wants the establishment of a more realistic timetable for completion of flood control structures.

h. Mr. George S. Willoughby, Jr.

Progress for Raleigh-Wake County Through

Orderly Development

Does not feel that the DEIS should contain the reference to the withdrawl of grant funds 1/1/76, although does agree that the acquisition of sites should be accelerated within the limits of the funding available from Wake County.

i. Mr. Victor V. Langston

Project Flood Control

Lives in flood plain. Wants no sewer line construction until dams are built. Suggests moving cutoff date of 1/1/76 back by a year or more.

j. Miss Anne Taylor

Sierra Club

If the sewer line is extended only to Richland Creek to serve the State Fairgrounds, Carter Stadium area, the completion of the SCS dams must still be a condition. The date mentioned in the Environmental Impact Statement could well be extended to allow completion of these dams, but the sewer line as planned or the sewer line only to the Richland Creek area must have the protection of all the dams. If the sewer line is installed, but tap-ons are not allowed until the SCS flood control structures are constructed as proposed by the Raleigh City Council, what is to prevent the next Council, if it should be different people, from reversing this Council's decision? Also, a developer would probably be within his legal rights to demand the right to tap on to the "best available means" of sewage disposal. The sewer line should not be installed until land is acquired for all structures and bids have been let for their construction.

k. Mr. R. A. Dunaway

Feels it would be foolish to bring the sewer line out and have more development before flooding is brought under control.

l. Mr. Tom Adams

Recommends that the line be installed while prices are perhaps lower than they will ever be, and that provision be made that no tap-ons would be permitted and that legal assurance of that be determined until such time as flood control is assured. To stall means to run the price up. Wants plan adopted which would assure immediate installation of the line but would prohibit use until adequate flood protection is afforded.

m. Mr. L. P. Zackary

Raleigh City Council

The City Council of Raleigh supports the construction of the Crabtree Creek interceptor sewer line provided this sewer service extention is performed in accordance with their resolution adopted February 7, 1974. The resolution is reproduced on page 224 of the DEIS. The City would permit sewer service to developing areas in watersheds upstream of flood control structures which are in place or under contract to be constructed. However, no connections would be allowed to the sewer line unless a reasonable ongoing program of land acquisition and construction of all the remaining necessary flood control structures is underway.

n. Mrs. Joyce Anderson

Wake Environmental Incorporated

EPA should require that structure No. 11 be under construction before the Richland Creek outfall can be constructed. EPA should expand its contract with the county to show that the county agrees to complete the watershed project as planned by 1/1/80, and that the county recognizes that EPA will not make reimbursement for any sewer line NW of Richland Creek until the watershed project is completed.

o. Mr. F. S. Worthy, Jr.

Commends EPA for the report and thinks that it is a good compromise. Urges completion of project now that the State, County, and Federal Government are cooperating.

p. Mayor Fred Bond (Cary)

Because of doubling of population since 1970, Cary's treatment plant has been condemned. They are waiting to tie into interceptor. They are concerned about the development of recreational facilities at Lake No. 3 but because of the lack of proper sewage disposal, are afraid that the lake will not be of any great use for recreation. Expeditious completion of the project is needed.

q. Mr. Charles Elam

The City of Cary has based all planning for future growth and development upon the completion of the Crabtree interceptor line, and local officials are ready to work toward the solution of any problem that impedes completion of the interceptor line.

r. Triangle J Council of Governments

The project should be funded as requested by Wake County. However, the lower Crabtree watershed must be protected from flooding at all reasonable cost. Construction grant funds should not be withdrawn from the project on January 1, 1976, if all land rights for the proposed SCS structures are not acquired by that date. Work should proceed on acquiring these land rights. So long as progress is being made, EPA grant funds should remain available to Wake County.

s. Mr. James L. Briley

Grant funds should be withheld until all land rights have been acquired and contracts for construction granted on all flood control structures. The deadline of January 1, 1976 should be extended until January 1, 1980.

t. Irvin B. Tucker, Jr.

On behalf of Mr. A. J. Harman and his enterprises, we desire to go on record as opposing the above-named project unless and until all of the proposed dams on Crabtree Creek are completed.

u. Mr. Lloyd M. Hedgepath

The funds for the sewer line should be withheld until the required dam sites for protection against a 100-year flood have been acquired and contracts for the dams have been let.

Response to Comments Related to January 1, 1976 Deadline for Completion of Land Acquisitions for Flood Control Structures

EPA has extended the deadline for land acquisition and deleted the requirement for purchase of land for Structure 25 for funding of the Richland Creek portion of the project. It is felt that adequate flood protection from development will be provided in the Richland Creek area by structure 11, together with the other structures already in place or under construction. It is still the position of EPA that implementation of the remaining structures is necessary to avoid a significant increase in flooding before the rest of the sewer line is constructed. It is not appropriate to allow construction of the line with a no-tap on provision since EPA cannot enforce this type of provision after grant funds are authorized.

Since the SCS is committed to the construction of the flood control structures, land acquisition is a sufficient grant condition rather than requiring construction contracts to be signed.

2. Comments concerning flood damage which will occur with the sewer line and the SCS structures

a. Mr. James O. Walker
Crabtree Creek Study Coordinator of the Corps of Engineers

The Corps of Engineers is currently studying alternative ways of solving the flood problems that will remain along Crabtree Creek after the upstream SCS structures are completed.

b. Mr. Robert E. Giles
Northwest Community Task Force

Wants assurance that the project will not be a contributing factor to endangering property and lives in downstream areas.

Questions lack of data on flood information in DEIS (how and by whom estimates of storm and flood frequency were made. Also wants specific information on frequency and amount of rainfall).

Request SCS and COE certify to EPA that flood control structures, land use, water runoff and development regulations that will be in effect will provide protection from flooding for the urban and commercial areas within and adjacent to Raleigh in the Crabtree Creek Basin.

Wants clarification on whether or not the 11 SCS flood control structures will provide 100-year flood protection.

c. Mr. Victor V. Langston
Project Flood Control

Notes serious discrepancies in statistical data on flooding from various agencies. Figures on 1973 flood range from 3 to 20 year frequency.

With 80 percent development and the SCS structures, average annual flood damages are estimated at $1,900,000. How much damage is acceptable?

d. UNC Water Resources
Water Resources Institute

An understanding of flood probabilities and damages under varying conditions of development and SCS structures would be more complete if the assumptions and methodology utilized in calculations were made available. The lack of reliable data makes one very uncomfortable with estimates which must be taken at face value.

e. U. S. Department of Interior

Assuming that the sewer will encourage urban development, we visualize that the flood problems will get considerably worse in Raleigh. The upstream flood-control reservoir being built by the SCS are supposedly to provide protection to Raleigh from the 100-year flood. However, if the upstream urban development produces the normal amount of sediment runoff, the protection offered by these reservoirs may be transitory. We suggest that this matter be considered in the environmental statement.

f. Mr. Lloyd M. Hedgepeth

The question of the rainfall frequency which is the basis for flood control design criteria should be resolved. The $1.9 million average annual flood damage is not to be considered acceptable. It seems that this is much too high a level for the annual average. The question of the rainfall frequency which is the basis for flood control design criteria should be resolved.

g. Mr. James L. Briley

Are we still going to be provided with 100-year flood protection with only eleven structures?

h. Mr. J. R. Bohannon, Jr.
Oak Park Glen Forest - Deblyn Park Civic Association

We do not believe the impact of the future Raleigh-Durham Airport development has been shown in sufficient depth with regard to increased surface drainage from that area.

Response to Comments Concerning Flood Damage Which Will Occur With the Sewer Line and the SCS Structures

The February, 1973, flood on Crabtree Creek was approximately a ten-year frequency flood, and the June, 1973, flood was approximately a 20-year flood. These flood frequencies should not be confused with rainfall or storm frequencies. The frequency of a flood is determined not only by the amount, duration, intensity, and distribution of rainfall, but also by soil permeability, antecedent soil-moisture conditions, land slope, and ground cover. See Appendix 13 for procedure for estimating flood damages and Wake County average rainfall data.

The average annual flood damages with and without SCS structures under current and 80 percent development conditions are shown on Table 10 of the FEIS. These figures are significantly less than those shown on Table 10 of the Draft EIS. The reason for the difference is a field study of elevations conducted by the U. S. Corps of Engineers. The study found that the topographic maps which had been used in figuring Table 10 in the Draft EIS were incorrect. The result was a drastic decrease in the level of damages. The construction of all eleven SCS structures does not represent complete 100-year flood protection (see the SCS's

DEIS entitled, "Crabtree Creek Watershed." December 1975, pp. 2,34, and 61). However, additional means of flood protection are being studied by the COE. Upon completion of their study, the COE will issue recommendations for mitigating remaining flooding. (Chapter II.A.3 in FEIS.)

The Wake County Erosion and Sedimentation Control Ordinance has been enacted to reduce the potential impact of increased sediment caused by growth.

3. Comments Concerning Alternative Methods of Flood Control

a. Mr. Victor V. Langston
Project Flood Control

The EIS did not consider in great enough depth the mitigative measure of purchase of flood plain property. Suggests that clearing certain areas in the flood plain and adding these areas to the Greenway System would be more economical than continually building structures to compensate for additional development.

b. Miss Anne Taylor
Sierra Club

The COE should publicly state its assurance that development encouraged by this sewer line will not necessitate the eventual channelization of Crabtree Creek.

would like to see the omission of the channelization option from the FEIS.

Flood victims should be given the opportunity to relocate under the COE's flood control project, or assurance given the citizens in the lower reaches of the watershed that the sewer line will not increase their flooding problems.

Wake County Commissioners should adopt subdivision regulations to assure retention of on-site runoff in order to alleviate increased rainstorm runoff caused by paving streets and building homes upstream.

c. UNC Water Resources Institute

On page 137, the alternative to acquisition of land rights for SCS structures appears to be unnecessary. Why should there be an alternative? The structures are needed and the land must be acquired. The "or until other measures are taken," offers a way out of what should be a commitment.

d. U. S. Department of Interior

We believe the environmental impact statement is inadequate in explaining the relationships of Raleigh's Capitol City Greenway Plan to the prepared project's "secondary" or indirect impact on future flooding in the area downstream of the proposed sewer line; namely, the

Lower Crabtree Creek Watershed area. Furthermore, it would seem that the current North Carolina, Wake County, and Raleigh municipal flood-plain ordinances, together with Raleigh's participation in the emergency Federal flood insurance program, provide some measure of insurance against the increased "probability of danger from flooding in downstream areas."

e. Mr. Lloyd M. Hedgepeth

The other measures to insure adequate flood control should be fully defined and analyzed. "Other measures" should not become a convenient loophole. Why not include, on a grant condition, the requirement for county land use plans which would restrict development to a level yielding no damage when the flood control dams are in place. Also, that if the sewer line is not built, permits for package plants (with their attendant development) should not be issued until the required dams are in place.

f. Mr. James L. Briley

Studies should be made to determine what additional measures should be taken to insure protection from 100 year floods. No further development should be allowed until flood control structures are completed.

g. Ms. Betty Ann Knudsen

League of Women Voters

The statement on page x of the DEIS should be changed to read, "Grant funds shall be withdrawn January 1, 1976, from the proposed project if land rights are not acquired for the Soil Conservation Service structures and agreement on other measures to insure adequate flood protection is not reached."

h. N. C. Department of Natural and Economic Resources

We suggest that EPA further condition approvals for this grant on the successful completion of the Action Plan by Wake County and Raleigh.

Response to Comments Concerning Alternative Methods of Flood Control

The discussion on page 137 in the DEIS on alternative means of flood control was presented to add as much flexibility as possible to the requirement of adequate flood protection. As of this time, however, no suitable alternative to the SCS flood control structures has been developed. As the COE comment letter in Appendix 12 states, "immediate action to facilitate completion of the SCS structures is imperative. Only then can any downstream non-strucural or structural flood control measures be fully effective." The COE is currently investigating what measures, additional to the SCS structures, would be appropriate to further improve the downstream flooding problem (page 54).

Comments concerning the advisability of channelization and subdivision regulations should be addressed to the study now being conducted by the COE (page 54). EPA has no authority to require land use controls or to limit the construction of package plants if the sewer line is not put in.

4. Comments Concerning the Need for Archaeological and Vegetative Surveys

a. Miss Anne Taylor
Sierra Club

An archaeological survey and vegetative survey should be part of the project.

b. North Carolina Department of Cultural Resources

This office would like to have an archaeological survey of the area prior to any construction. We are requesting this survey because archaeological sites are known from the vicinity and because they are found in the same ecological situations which will be impacted by the sewer. Until such time as this survey is performed by a competent, professional archaeologist, this office would have to comment adversely upon the project.

c. Mrs. Martha M. Gardner

Crabtree Creek Citizens Assistance Committee

To ensure that endangered or threatened plants along the project area are located and inventoried, I strongly recommend that a survey of plants other than woody vegetation be made.

Response to Comments Concerning the Need for Archaeological and Vegetative Surveys

Archaeological and vegetative surveys have been done along the interceptor right-of-way (Appendices 14 and 15). Unique plant communities other than woody vegetative were part of the vegetative survey. The proposed list of endangered plants has not yet been officially adopted by the U. S. government.

5. Comments On the Capital City Greenway Plan

A. Miss Anne Taylor

Sierra Club

A public recreation area along the route of the sewer line would benefit the people who are paying for the sewer. A Greenway system up to Umstead State Park and around to Cary would provide a form of transportation and recreation which would benefit all of the citizens of Raleigh, Cary, and Wake County.

b. Mr. R. A. Dunaway

Fears Greenway proposition will be overlooked. The Greenway is one of the biggest considerations in making Raleigh one of the best places to live. Does not want Greenway to come to Umstead Park. Does want it to come to Cary, but would like to have it come up Turkey Creek and the rest of the county.

c. Mrs. Joyce Anderson

Wake Environment, Inc.

The right-of-way for the sewer line and the land needed for the remaining flood retention structures should be purchased in fee simple. A linear open space network would then be available for future development as Greenway trails and recreational activity areas linking Raleigh, Cary, and Umstead Park.

d. U. S. Army Corps of Engineers

We note with interest that a multi-purpose project right-of-way presents an excellent opportunity to commit flood-plain lands to the Capital City Greenway.

e. U. S. Department of Interior

The flood-plain ordinances and insurance program bear a direct, beneficial relationship to the Greenway system plans. The environmental impact statement should also explain what effects the proposed project will have on the ordinances and insurance program if the SCS structures are installed.

f. U. S. Forest Service

We recommend that multiple use of the total right-of-way (for hiking, bicycle trails, conservation education, etc.) be fully considered and incorporated in the project design, and that a fully coordinated plan for multiple use of the right-of-way be made part of this proposed project.

g. Mr. Russell C. Walton

He opposes the construction of the Greenway. Feels it will invite undesirables into the area.

h. U. S. Soil Conservation Service

The report does not address itself to alternative productive uses of the land involved in the sewer line right-of-way or the productivity of the land area that will be indirectly affected by the installation of the sewer line.

Response to Comments on the Capital City Greenway Plan

The locally conceived Greenway System (Appendix 16) would use the sewer right-of-way as a bike and hiking trail and linear park. This type of multiple use of right-of-way is to be encouraged. EPA regulations do not provide funding mechanisms for the purchase of right-of-way land so this agency can give no direct financial help to this desirable project. The existing land uses in the sewer interceptor right-of-way are shown on page 5 of the second letter in Appendix 17.

6. Comments on Routing Through Umstead Park

a. U. S. Department of Interior

From the information presented in the draft statement, it is unclear whether the proposed project right-of-way will require taking any land from the William B. Umstead State Park. From the sentence in the Draft Statement that "The 36-inch main serves the Upper Richland Creek Basin" (p.8), we conclude that the 21-inch force main itself will bypass the park. However, the project will cut a 40-foot right-of-way (p.87) and figures 7 and 17 show the proposed project will cross Umstead State Park.

b. N. C. Department of Natural and Economic Resources

The land between the present park boundary and I-40 is scheduled for acquisition by the State for inclusion in the State park. The proposed sewer line, therefore, would ultimately be located within the boundary of Umstead Park as it parallels I-40 and any environmental damages occurring during construction will be within the proposed park boundary. This would be incompatible with the park and therefore unacceptable to this agency. We suggest that consideration be given to having the sewer line cross I-40 at Trenton Road rather than at the Reedy Creek Road crossing and that the line be located within the I-40 road cut on the south side of the highway as it parallels I-40.

c. Mr. Russell C. Walton

Pumping for eternity would be much more costly than to run the sewer along the creek right through the park. Umstead is a natural area, only about forty years old. To pump over the hill for years to come will cost more than the whole park to begin with.

Response to Comments on Routing Through Umstead Park

The interceptor will cross I-40 at Trenton Road rather than at Reedy Creek Road and will follow the cut on the south side of the highway as it parallels I-40.

7. Comments on Right-of-Way Cleared for Sewer Line

a. U. S. Forest Service

We question the need to maintain the 40-foot width of the right-of-way clear of trees and shrubs. At a minimum, these trees along the right-of-way line which do not survive construction damages (such as severance of lateral roots, soil compaction, disturbance of natural drainages, the piling of dirt above the root collars, etc.) should be replaced immediately.

To the extent possible, turns should be designed into long straight segments of the line of sight along the right-of-way.

b. U. S. Soil Conservation Service

Observations of current sewer line installations indicate actual right-of-way use following standard construction practices involve considerably more than a forty-foot right-of-way to allow for proper water management and erosion control where any cuts or fills are made in conjunction with the installation of the sewer line. Adequate right-of-way to insure stable cut and fill slopes should be obtained as well as temporary and permanent surface water disposal easements.

Permanent stabilization of the construction right-of-way should include appropriate shrubs and ground cover, as well as grasses, to reduce long-term maintenance cost and erosion and resulting sedimentation. The use of wildlife food-producing perennials for this purpose would be desirable.

c. N. C. Department of Natural and Economic Resources

The EIS should clearly state how the right-of-way will be maintained. If chemical control is planned, the chemical name, rate, and frequency of treatment planned should be given.

d. Mrs. Joyce Anderson
Wake Environment, Inc.

EPA should give serious study to the possibility of revegetation along the outermost ten feet of either side of the 13 meter right-of-way with bottom land hardwood vegetation.

e. Mr. Robert E. Giles

The FEIS should make it a mandatory requirement that the width of the right-of-way be 10 meters or less in existing residential and other particularly aesthetic areas.

Response to Comments on Right-of-Way Cleared for Sewer Line

The cutting of a 40-foot right-of-way for installation of the sewer line will be necessary along most of the line. Where possible, a smaller cut will be taken. Also, larger cuts will be taken in any area necessary to insure that stable cut and fill slopes can be obtained during construction. Appropriate vegetation will be used to stabilize the soil along the right-of-way. No herbicides will be utilized to control vegetation on the right-of-way. The width of right-of-way maintained after construction will be that which is necessary to allow for maintenance work to be conducted and to keep tree roots away from the pipe.

8. Comments on Walnut Creek Alternative

a. Robert E. Giles

We take strong exception to the analysis and conclusions stated in the DEIS regarding this alternative. The FIES should address the following points: Savings from need to run parallel interceptor up to present Oak Park location, savings and lessened impact from cutting out the segment from Oak Park to pumping station west of Umstead State Park, cost of additional lift capacity from upper Crabtree Basin to Walnut Basin, and cost of additional flow from State Fairgrounds to Walnut Creek.

b. Anne Taylor, Joyce Anderson, Martha Gardner

We would appreciate further study and cost analysis of Walnut Creek alternative. Specifically, is there a major cost difference in the proposed pumping station at Richland Creek and a pumping station to Walnut Creek? What is the difference in annual O&M costs of pumping station vs. gravity flow? What areas of the upper watershed would be without service if the Walnut Creek route were used? Would use of the Walnut Creek line avoid the necessity of a parallel line from Oak Park to the Crabtree Mall area?

Response to Comments on Walnut Creek Alternative

An economic analysis was performed by EPA to determine if it would be advantageous to use the Walnut Creek interceptor system to transport the wastes generated in the Upper Crabtree Creek area rather than using the Crabtree Creek interceptor system as proposed in the Draft EIS. The results of that analysis is as follows:

COSTS

	Proposed Plan (Crabtree Creek)	Alternative Plan (Walnut Creek)
Interceptors within the Upper Crabtree Creek Planning Area	2,600,000	2,178,000
Interceptors Outside the Planning area	2,687,000	3,807,000
Pumping stations	1,800,000	3,940,000
Force Mains	256,000	816,000
TOTALS	7,343,000	10,741,000

As the chart indicates, the cost of the Walnut Creek alternative is significantly higher because of the costs related to pumping the sewage from one drainage area into another. These costs are reflected in the figures for pumping station and force mains. These costs far outweigh the cost saved by not having to parallel a portion of the existing Crabtree interceptor line if the Walnut Creek alternative is chosen (see Table 8). Also, the effect of not having to construct a line from Oak Park to the pumping station west of Umstead State Park is equalized by the additional line required to the Walnut Creek Basin.

Further, this alternative routing does not provide any wastewater transmission system for the Turkey Creek basin.

9. **Comments on Adverse Impacts of SCS Structure No. 11**

a. Mr. Russell C. Walton

SCS structure No. 11 has been moved from where it is located in pages 56 and 57 in the DEIS. The structure has been moved to a position near the park boundary of Umstead Park. This involves 35 acres of my farm and results in the closing of Reedy Creek Road which is the primary road for people in this area. I urge you to hold all funds and require that suitable planning be made to prevent such things as flooding to prevent flooding and the closing of public roads.

b. Mr. and Mrs. Robert Butler

The closing of Reedy Creek Road would cause me and my neighbors to drive more miles to work and would be a real hardship on us. We do not object to flood control programs, only closing of Reedy Creek Road.

c. Mr. Rex Gary Schmidt

The closing of Reedy Creek Road will create a hardship for its users, double the mileage and driving costs of the residents and users, and cause a devaluation of our properties. If the lake is necessary, then mitigation should be provided through construction of a new bridge sufficient to abrogate this problem.

d. Mrs. Ben L. Clifton

I urge you to hold all funds and require that suitable planning be made to prevent such things as flooding to prevent flooding and closing of public roads. I have owned land on road #1655 for about forty years, and the closing of Reedy Creek Road will seriously devalue my property.

e. Mrs. Mary H. Chappell

I urge you to hold all funds and require that suitable planning be made to prevent such things as flooding to prevent flooding, and closing of public roads.

f. Mrs. Lucille Grissom

I urge you to hold all funds and require that suitable planning be made to prevent such things as flooding to prevent flooding, and closing of public roads.

g. Dr. Terry C. Dunn and Dr. William L. Dunn

It should be pointed out that it is of primary importance that both Trenton and Reedy Creek Roads are not closed simultaneously as no access to and from the places of residence of those of us living on Reedy Creek and Trenton Roads would be possible. This could happen if Structure #11 closes Reedy Creek Road and sewer line construction closes Trenton Road. An impact statement on the SCS projects should be required.

h. Ms. Martha Walton

Keep structure No. 11 as shown on page 56 - Don't allow road #1650 to be closed.

i. Ms. Margie Walton

Keep structure No. 11 as shown on page 56.

j. Ms. Mary Walton

Keep structure No. 11 as shown on page 56.

k. Mr. Charles Patta

Keep structure No. 11 as shown on page 56.

l. Mr. David Portet

Keep structure No. 11 as shown on page 56.

m. Mr. Russell Lee Walton

Keep structure No. 11 as shown on page 56.

n. Mr. Bill White

Keep structure No. 11 as shown on page 56.

o. Mr. D. E. Henderson

Keep structure No. 11 as shown on page 56.

p. Mr. James C. Johnson

Keep structure No. 11 as shown on page 56.

q. Mr. Russell Walk, Jr.

Keep structure No. 11 as shown on page 56.

r. Mr. Joe A. Marlin

Keep structure No. 11 as shown on page 56.

s. Mr. John Cromwell, Jr.

Keep structure No. 11 as shown on page 56.

t. Mr. Thomas Crews, Jr.

Keep structure No. 11 as shown on page 56.

u. Mr. H. A. Smith:

Wake County Department of Natural Resources

It is correct that structure No. 11 has been relocated to a new site different from that shown in the DEIS and this location would cause the closing of Reedy Creek Road. As a result of citizen complaints, we have entered into negotiations with the North Carolina Department of Transportation to elevate the bridge and keep the road open. We feel the expense to Wake County is justified due to the objections and the apparent inconvenience that will be caused to residents in the area.

Response to Comments on Adverse Impacts of Structure No. 11

As the letter from Mr. H. A. Smith (Appendix 12) indicates, Wake County is committed to keeping Reedy Creek Road open by raising the bridge. Comments concerning other possible adverse impacts of the structure should be addressed in the SCS publication "Crabtree Creek Watershed, Draft Environmental Impact Statement, December 1975".

10. Comments on Growth Related Impacts

a. U. S. Forest Service

Among stated benefits of the project are stimulation of the rate of development and allowances for increased densities in the project service area. Without a comprehensive land use plan for the Upper Crabtree Creek Basin, how is the public investment in the project and public concern for maintenance of environmental quality safeguarded against unsuitable development within the flood plain and possibly over-development in portions of the basin?

b. N. C. Department of Natural and Economic Resources

Our staff expressed substantial concern regarding the implications of the potential secondary impacts of growth and development that will be the result of construction of this sewer line.

Response to Comments on Growth Related Impacts

Wake County is currently in the process of revising its land use plan for the service area based upon urban runoff data recently compiled. Upon completion, this plan will help to guide growth in an orderly manner. The probable impact of growth induced by the project upon community facilities costs is shown on page 7 of the second letter in Appendix 17.

11. Comments on Odor Problems Resulting from Project Construction

a. Ms. Betty Ann Knudson

League of Women Voters

The detrimental effects of odor problems on established neighborhoods are great enough so that adequate procedures to prevent the problem before it occurs should be established.

b. UNC Water Resources Research Institute

While I have no personal experience with aeration of sewage for odor control, I would question whether this could be done effectively within the limited space available in pumping stations. Even so, exhaust venting would itself become a source of offensive odors. Would chlorination be more effective?

c. Mr. Robert E. Giles

The FEIS should contain language to require measures which would assure that there would be no discernible odors, especially where the line might run through developed areas.

Response to Comments on Odor Problems

The design of the lift station will include facilities for aeration of the wastewater. This will alleviate the potential odor impact.

12. Comment On Assurance that Project is Completed as Planned

a. J. R. Bohannon, Jr.:

Oak Park - Glen Forest - Deblyn Park
Civic Association

We feel it is essential to provide adequate confidence that the project will be successfully completed as originally planned. We recommend that the definitized plan include a stated set of conditions or technical specifications as an appendix to the FEIS.

Response to Comment on Assurance that Project is Completed as Planned

A grant will not be given until the land has been purchased for the flood control structures. Other mitigative measures which will either be required or recommended are listed in the Summary and in Chapter V. Mitigative measures related to the construction of the flood control structures should be discussed in the DEIS by the SCS, "Crabtree Creek Watershed, DEIS, December, 1975".

13. Comment Concerning Wake County "Plan of Action"

a. Mr. Robert E. Giles

The FEIS should contain an up-to-date report on the progress of the County in accomplishing the things called for in the County Plan of Action (Appendix 7).

Response to Comment Concerning "Plan of Action"

Appendix 18 contains status reports on the SCS flood control structures. The development of new land use plans and control ordinances referred to in the "Plan of Action" is still in the preliminary stage.

14. Comment on the Use of Vents Instead of Man Holes

a. Mr. Robert E. Giles

The FEIS should provide that the vents will extend underground from their connection with the sewer line, so as to emerge and rise above ground at the right-of-way edge nearest the creek.

Response to Comment Concerning the Use of Vents Instead of Man Holes

The use of a snorkel device or underground piping (see VB5) is now being considered. One of these methods will be used if found to be feasible.

15. Miscellaneous Comments No Response Given

a. Ms. Betty Ann Knudsen

League of Women Voters

It seems to us that there should be some procedure requiring either outright donation or at least a way to acquire the land for the dams at some reasonable price not dependent on inflated development potential.

b. N. C. Department of Agriculture

We have many people congregate at the fairgrounds during fair week and we have to make temporary provisions in some areas of the fairgrounds for sanitary sewage disposal. Even though we take the necessary precautions, we recognize this as a potential health hazard which could be cured by the extention of the Richland Creek sewer outfall.

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APPENDIX 1

Initial Public Correspondence

OAK PARK - GLEN FOREST - DEBLYN PARK
Civic Association
Raleigh, N.C. 27612

P. O. Box 30357

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APR 30 1973

April 25, 1973

Mr. Jack Ravan, Regional Administrator
Environmental Protection Agency
1421 Peachtree Street, N. E.
Atlanta, Georgia 30309

Reference: EPA Project C370344
Wake County, N. C.

Dear Mr. Ravan:

The Environmental Protection Agency proposes to make a grant of Federal funds for the construction of waste treatment facilities in Wake County, including a large sewer outfall line along Crabtree Creek west of the City of Raleigh.

You have already heard from other citizen groups in Wake County who have expressed serious environmental concerns about this project as presently proposed. This Association expresses, on behalf of its members, these same concerns and joins with others in strongly urging that you take prompt action to ensure the preparation of an Impact Statement with respect to this EPA grant project, in accord with the National Environmental Policy Act.

This Association shares with your agency, with County officials and with others the desire to see adequate provision for waste treatment facilities throughout Wake County, to eliminate the continuing and worsening pollution of our streams. But the very laudable objective of purer and cleaner streams should be achieved by means which are entirely compatible with other equally vital environmental interests.

Your prompt action in requiring the Impact Statement in accord with applicable Federal laws and regulations will be greatly appreciated.

We shall look forward to hearing from you in the near future.

Sincerely,

Robert E. Giles
President

cc: Mr. Waverly Akins, Chairman
Wake County Board of Commissioners

Mr. Joseph Sanders
County Coordinator

Mr. John Scott, Director
County Planning Department

Members, County Planning Board

4312 Oak Park Road
Raleigh, N. C. 27612
April 21, 1973

Mr. Jack Ravan, Regional Administrator
Environmental Protection Agency
1421 Peachtree Street, N. E.
Atlanta, Georgia 30309

Reference: EPA Project C370344
Wake County, N. C.

Dear Mr. Ravan:

By letter dated December 29, 1972, to Mr. Garland H. Jones, County Manager, Mr. James R. Westlake of your office extended to Wake County an offer of a Federal grant of $2,445,750 for the construction of proposed waste treatment facilities. This offer was subsequently accepted by the County.

This project includes what has come to be called the Crabtree Creek sewer outfall line. Property owners residing in Oak Park whose land would be traversed by the proposed outfall line became aware of the project in February of this year when an engineering firm, retained by the County, conducted surveys across our property.

Enclosed is a copy of a letter dated February 23, 1973, signed by twelve property owners in Oak Park, addressed to Mr. Joseph Sanders of the Wake County government. This letter sets forth the concerns which we have expressed to the County regarding this proposed project.

We now restate these same concerns to the Environmental Protection Agency. Furthermore, we feel that these additional points must be stated:

> The proposed sewer outfall will open an additional 29,000 acres of land for development. This additional 29,000 acres in the Crabtree watershed lies "upstream" of Oak Park, which is in turn "upstream" from the City of Raleigh. Development of this additional 29,000 acres, and the associated increase in runoff and sediment buildup, will greatly increase the flood potential of Crabtree Creek. It should be noted that on February 2, 1973, a 3.5 inch rain caused considerable flooding and extensive damage along the Crabtree throughout the City of Raleigh. The February, 1973, flood was considered to be a once in two to five year frequency flood. Development of the upper Crabtree watershed, which will follow the proposed sewer outfall, can only create more flooding for land which is already flood-prone and will undoubtedly create a much greater flood plain. That is, land which is not now considered to be in the flood plain will eventually flood with every heavy rain unless proper planning and timing are exercised.
>
> It is true that flood control dams are being built along the Crabtree. However, the program to build the dams was initiated as the result of a flood which occured in May, 1957. There were originally 15 dams planned along the creek, but due to a number of problems that number has been reduced to 11. Of the 11, only two dams have been completed with a third structure to be completed this year. It is evident that at this rate, the

completion of these 11 dams lies well in the future and it can reasonably be pondered if all 11 will ever be completed. It appears quite evident on the other hand that the proposed Crabtree Creek sewer outfall would be completed in a much shorter time. The subsequent development of the upper Crabtree watershed would then precede the flood control measures. Furthermore, the limits of the flood plain for a once in 100 year frequency flood should be calculated taking into account the increased runoff resulting from the development of the upper Crabtree watershed. This additional development will undoubtedly require more stringent flood control measures than are currently proposed for the 11 dams. It appears quite obvious that the impact of the proposed Crabtree sewer outfall has yet to be brought into focus.

I am writing to you as the Chairman of the Oak Park property owners group, to submit our formal, official request that the Environmental Protection Agency, in conformance with the National Environmental Policy Act, 42 United States Code, Sections 4321 et.seq. and in conformance with Executive Order No. 11514, 35 F.R. 4247, March 5, 1970 take prompt action to ensure the preparation of an Impact Statement with respect to this EPA grant project. It appears to us that award of this grant is indeed an action on the part of the Environmental Protection Agency "Significantly affecting the quality of the human environment;" and therefore, the provisions of the Federal statutes and of Executive Order No. 11514 pertaining to an Impact Statement are clearly applicable.

County officials have been most courteous and helpful to us in furnishing information on the status of the project. However, it seems to us that fundamental issues of marked environmental concern have not been given full and adequate consideration--in a coordinated manner--by such agencies as the Soil Conservation Service, the Corps of Engineers, and the City of Raleigh, particularly with respect to flood control implications. In order for the environmental issues to be fully resolved, we feel that an Impact Statement is in order.

Your prompt consideration of this request will be greatly appreciated, and we shall look forward to hearing from you.

Sincerely yours,

Lloyd M. Hedgepeth

Lloyd M. Hedgepeth

cc: Mr. Waverly Akins, Chairman
Wake Co. Board of Commissioners

Mr. Garland H. Jones
County Manager

Mr. Joseph Sanders
County Coordinator

Mr. John Scott, Director
County Planning Department

SIERRA CLUB Joseph LeConte Chapter
. . . To explore, enjoy and preserve the nation's forests, waters, wildlife and wilderness . . .

March 25, 1973

Mr. Jack Ravan, Regional Administrator
Environmental Protection Agency
1421 Peachtree Street, N. E.
Atlanta, Georgia 30309

RE: PROJECT EPA C 370 344
CRABTREE CREEK SEWER OUTFALL

Dear Mr. Ravan:

As Mr. Matuszeski suggested in his letter of March 16, 1973, I am providing a brief analysis of the issues we believe need to be given special consideration.

Of great concern to us is the capability of Crabtree Creek to carry the quantity and quality of increased runoff from development which will result from the installation of this line. The eleven dams planned by the Soil Conservation Service will perhaps alleviate the existing flooding when they are completed. There are presently two dams completed with a third under construction. Land acquisition is held up in court proceedings. The Corps of Engineers is studying the flooding along the creek with input from the Crabtree Creek Citizens Advisory Committee as a result of public outcry when SCS first published its watershed program of extensive channelization.

We know that heavy development,which this major outfall is designed to accommodate, will greatly increase the amount and rate of runoff in the watershed above the City of Raleigh and although the line does circumvent Umstead Park, we believe the valued laurel and rhododendron in the Park will suffer or be lost as Crabtree Creek adjusts itself to the increased flow and sediment over a long term period.

Sediment control, floodplain regulation and area planning, though all are imminent, are not yet applied to Wake County. There are differences of opinion as to whether sediment control measures could adequately control upstream development. It may be that the proposed Wake County Development Guide's relation to development in the upper watershed will be useful. This is being prepared in Mr. John Scott's office, Wake County Planning Department.

We might also mention a decision by a private developer and the City of Raleigh to install a smaller sewer line through unique vegetation on the south bank of Crabtree Creek directly paralleling the route of the subject sewer outfall causing double destruction in that particular area. The City has chosen not to provide an environmental impact study for that development or that sewer line, although residents of the area requested it.

Flooding of Crabtree Creek is a major problem for which we believe there is, under existing conditions, an environmentally sound remedy. We believe the environmental impact of this project as planned will be quite extensive and we will appreciate the opportunity to be of assistance as you study the matter.

With kind regards, I am

Yours very truly,

Anne Taylor

Anne Taylor, Conservation Chairman
Research Triangle Group

4217 Laurel Ridge
Raleigh, N. C. 27612

CC: Council on Environmental Quality

APPENDIX 2

Notice of Intent

NOTICE OF INTENT

The Environmental Protection Agency, Region IV, and the State of North Carolina will prepare an environmental impact statement on EPA Wastewater Treatment Project C-370344, the Crabtree Creek interceptor sewer system.

EPA proposes to contribute $2,445,070 toward a total cost of $3,561,000 for the project. The balance will be paid by Wake County, the applicant, and the State of North Carolina.

The facilities are to be located in Wake County, west of Raleigh, North Carolina and include interceptor lines, a force main, and a pumping station.

Major issues to be addressed in this statement include

- Flood frequency and magnitude
- Water quality and secondary effects
- Sedimentation
- Wildlife and vegetation
- Aesthetics.

Comments are invited and should be sent to

David R. Hopkins
Chief, EIS Branch
Environmental Protection Agency
1421 Peachtree Street, NE
Atlanta, Georgia 30309

A public hearing will be held following publication of the draft environmental impact statement.

Jack E. Ravan
Regional Administrator

APPENDIX 3

Inspection Reports and Data on Existing Wastewater Treatment Plants

INSPECTION REPORT

MOBILE CITY MOBILE HOME PARK
WASTEWATER TREATMENT FACILITIES
WAKE COUNTY

BY

Randall Kornegay, Analytical Chemist
Central Regional Office
Office of Water and Air Resources
October 16, 1972

The wastewater treatment facilities serving Mobile City Mobile Home Park near Morrisville (SR 1615) were inspected on September 6, 1972.

The treatment facilities consist of a 21,000 GPD extended aeration type, chlorination, and the discharge of the treated effluent into an unnamed tributary to Crabtree Creek, in the Neuse River Basin.

PERSONNEL

Mr. J. T. Hobby, Jr., President
Mr. Cecil Sears, Manager (WTPO I - Grandfather Clause)

OPERATOR CLASSIFICATION FOR TREATMENT FACILITIES

WTPO I

PERMIT

Number 561
Expiration Date: June 30, 1969

RECEIVING STREAM

The effluent discharges into an unnamed tributary to Crabtree Creek. The average discharge of the receiving stream is 0.8 cfs and the 7-day 10-year minimum discharge is 0 cfs.

The following data was obtained from the Stream Monitoring Section of the Office of Water and Air Resources:

Upstream

Date	Dissolved Oxygen	Temperature	pH
8-16-72	8.0 mg/1	20°C	5.4
8-23-72	7.2 mg/1	24°C	4.5
8-29-72	6.9 mg/1	25°C	6.3
9-6-72	8.7 mg/1	19°C	3.3
9-13-72	7.0 mg/1	19°C	5.2

Downstream

Date	Dissolved Oxygen	Temperature	pH
8-16-72	3.0 mg/l	22°C	6.4
8-23-72	5.2 mg/l	22°C	7.1
8-29-72	3.6 mg/l	23°C	6.5
9-6-72	8.0 mg/l	19°C	5.1
9-13-72	5.2 mg/l	19°C	6.5

The stream was noted to be turbid and to have a slight sulfide odor at times, downstream from the treatment facilities.

LABORATORY AND FIELD TESTS

Effluent

B.O.D. - 5 day, mg/l - 10
Residue: Suspended, mg/l - 9
Volatile, mg/l - 8
Fixed, mg/l - 1
Dissolved Oxygen, mg/l - 0.0 *
Temperature, °C - 23
Chlorine Residual, mg/l - 1.5
Flow Rate at 11:30 a.m., GPD - 185,000

* Note: Test was made before chlorination.

MAINTENANCE AND OPERATION

1. Aeration basin has a sufficient amount of air induced, light brown color, and a musty odor.

2. Floating solids were present in the settling basin indicating a poor return of solids to the aeration basin.

3. In general, the proper maintenance and operational procedures are followed in a satisfactory manner.

LABORATORY FACILITIES (Reports and Records)

Facilities are not available to perform the necessary wastewater analysis. Records are not kept and reports are not prepared.

DESIGN CRITERIA FOR PERFORMANCE

The treatment facilities are expected to effect overall reductions in pollution as follows:

B.O.D. - 92%
Total Solids - 85%
Suspended Solids - 90%
Coliform Bacteria - 98%
Flow - 21,000 GPD

PERFORMANCE

The treatment facilities are effecting overall reductions in pollution as follows:

Using the data obtained from the laboratory section of the Office of Water and Air Resources and the standard data of raw wastewater (B.O.D. and Suspended Solids - 250 mg/1).

B.O.D. - 96%
Suspended Solids - 96%
Flow (estimated) - 16,000 GPD (serving 100 trailers)

Conclusions

The treatment facilities were performing in accordance with the conditions of the permit and protecting water quality standards at the time of the inspection. However, due to the poor return of solids from the settling basin to the aeration basin, water quality standards in the receiving stream could be violated at times.

RECOMMENDATIONS:

1.. Explore the possibility of constructing a fine solids settling pond for the effluent.

N. C. Office of Water and Air Resources
Inspection Report of
Wastewater Treatment Facilities

Date of Inspection
9/27/73

County
Wake

A. GENERAL INFORMATION

1. PLANT

(a) NAME	(b.) OWNER	(c). LOCATION
Cary Wastewater Treatment Plant	Town of Cary	Cary

2. Description of Treatment Facilities (Include Design Flow)

The treatment facilities (secondary type) providing a capacity of 100,000 GPD, consist of primary and secondary settling, low rate filtration with recirculation, sludge drying beds, and the discharge of the treated effluent into Coles Branch, a tributary to Crabtree Creek, in the Neuse River Basin.

Location of Discharge:
Adjacent to Treatment Facilities.

3. Personnel

Mr. Harry Conte - Town Manager
Mr. Norman Padget - Director of Public Works
Mr. John Smith - Operator
* Mr. Carlton Ruth - Operator

* Present during inspection

4. Treatment Facilities Classification

WTPO I

Permit Status
Number: T-563
Expiration Date: 4-30-76

5. Receiving Stream Statistics

Name of Stream: Coles Branch
River Basin: Neuse River
Stream Classification: "D"
OWAR Sub Basin No.: 09-02
EPA Sub Basin No.: 03-04-02

County: Wake
U.S.G.S. No.:
Location:
7-Day, 10-Year Min. Dis:
Estimated Average Discharge: 0 cfs
Drainage Area:

Reproduced from best available copy.

GUIDE - VISUAL OBSERVATION - UNIT PROCESS

RATING CODES: S - Satisfactory; U - Unsatisfactory; M - Marginal; IN - In Operation; OUT - Out of Operation

	CONDITION OR APPEARANCE	RATING	COMMENTS
GENERAL	GROUNDS	S	
	BUILDINGS		
	POTABLE WATER SUPPLY PROT.	S	
	SAFETY FEATURES	S	
	BYPASSES	S	
	STORM WATER OVERFLOWS	S	
PRELIMINARY	MAINTENANCE OF COLLECTION SYSTEM	S	
	PUMP STATION	* M	* Periodic break-downs has occurred at Greenwood Forest and Stoney Brook Pump Stations
	VENTILATION	S	
	BAR SCREEN	S	
	DISPOSAL OF SCREENINGS	S	
	COMMINUTOR		
	GRIT CHAMBER		
	DISPOSAL OF GRIT		
PRIMARY	SETTLING TANKS	S	
	SCUM REMOVAL	S	
	SLUDGE REMOVAL	M	Need to waste sludge
	EFFLUENT	S	
SLUDGE DISPOSAL	DIGESTERS		
	TEMPERATURE AND pH		
	GAS PRODUCTION		
	HEATING EQUIPMENT		
	SLUDGE PUMPS		
	DRYING BEDS	S	
	VACUUM FILTER		
	INCINERATION		
	DISPOSAL OF SLUDGE	S	
OTHER	FLOW METER AND RECORDER	U	No flow measurements made
	RECORDS	U	No records kept
	LAB CONTROLS	U	No lab controls made
SECONDARY-TERTIARY (List items as required)	Trickling Filter	S	Some leakage from seal.
	Secondary Clarifier	S	
CHLORINE	EFFLUENT		
	CHLORINATORS		
	EFFECTIVE DOSAGE		
	CONTACT TIME		
	CONTACT TANK		

Page 2

Plant Performance

From: (Month Year)	To: (Month Year)	Max. Flow Month	Min. Flow Month

	Flow (MGD)	B.O.D. (mg/l) Influent	B.O.D. (mg/l) Effluent	% Removal	Suspended Solids (mg/l) Influent	Suspended Solids (mg/l) Effluent	% Removal
Average Annual	No data available						
Average Max. Flow Month							
Average Min. Flow Month							
Design							

Equipment Program

	Adequate	Inadequate	Comments
Routine Maintenance	X		
Records		X	No records kept
Spare Parts Inventory	X		

Laboratory Tests (Performed by Water & Air)

	Influent (Grab Sample)	Effluent
B.O.D., 5-day, mg/l	130	22
Residue: Suspended, mg/l	108	44
Volatile, mg/l	52	22
Fixed, mg/l	56	22
p^H	7.1	7.1

Estimated Flow - 60,000 GPD

Design Flow - 100,000 GPD

Comments:

The treatment facilities in general are operated and maintained in a satisfactory manner. The system is in need of sludge removal and effluent chlorination. Chlorination of the effluent is needed due to the low flow of the receiving stream in a congested area. Periodic break-downs have occurred at the Greenwood Forest and Stoney Brook pump stations due to mechanical failure. These two pump stations will be replaced by December 31, 1973 by the new Southeastern Regional Pump Station. The operator of the facilities is not certified. The treatment facilities will be abandoned when Raleigh's new treatment plant is placed into operation.

Recommendations:

1. Remove sludge.
2. Install chlorination unit and maintain residual of 1.0 mg/l.
3. File request for operator's certification.

Inspection Performed by: Randall Kornegay, Analytical Chemist

DATA SUMMARY

OFFICE OF WATER AND AIR RESOURCES

River Basin	River Miles	Stream Classification	Station Number
Neuse		D	31C

Station Name: Coles Branch near Cary, N.C.

Station Location: Located on Coles Branch, 0.3 mi. below point of effluent discharge from Town of Cary sewage treatment plant.

Date Collected			8-29-73					
Day			T					
Time			1035					
Discharge								
Temp. °C			24/75					
D.O.	Mg/l		1.4					
	% Sat.		16					
pH			7.4					
Alkalinity	to 8.3 Mg/l		0					
	to 4.5 Mg/l		150					
Acidity	to 4.5 Mg/l							
	to 8.3 Mg/l							
30 min. Settlable Solids								
Arsenic Mg/l								
5 Day BOD	at 20°C Mg/l		18					
	at 20°C lbs/day							
Cadmium Mg/l								
Total Carbon	Organic Mg/l							
	Inorganic Mg/l							
COD Mg/l								
Chlorides Mg/l								
Chromium	Hexavalent Mg/l							
	Total Mg/l							
Cobalt Mg/l								
Color units								
Copper Mg/l								
Cyanide Mg/l								
Coli-form	per/100 MF	Fecal	6100					
		Total						
	MPN/100ml	Fecal						
		Total						
Flouride Mg/l								
Formaldehyde Mg/l								
Grease Mg/l								
Hardness as $CaCO_3$ Mg/l								
Iron Mg/l								
Lead Mg/l								
Mercury ug/l								
Nickel Mg/l								
Nitrogen	Ammonia Mg/l							
	Total Kjeldahl Mg/l							
	Nitrate &Nitrite Mg/l							
Phenols Mg/l								
Phophorous Mg/l								
Residue Mg/l	Total							
	Suspended							
	Dissolved							
Resin Acid Soap Mg/l								
Sulfate Mg/l								
Sulfide Mg/l								
Synthetic Detergent Mg/l								
Turbidity units								
Zinc Mg/l								

APPENDIX 4

Woody Vegetation Inventory

Woody Vegetation of the Umstead Park-Research Triangle Area

Scientific Name	Common Name
Acer negundo L.	boxelder
Acer rubrum L.	red maple
Acer saccharum ssp. *floridanum* (Chap.) Desm.	Florida maple
Aesculus sylvatica Bartr.	painted buckeye
Ailanthus altissima (Mill.) Swingle	ailanthus
Albizia julibrissin Durazz.	mimosa
Alnus serrulata (Ait.) Willd	hazel alder
Amelanchier arborea (Michx.f.) Fern.	downy serviceberry
Aralia spinosa L.	Devils-walkingstick
Asimina triloba (L.) Dunal	pawpaw
Bacharis halimifolia	groundsel tree
Betula nigra L.	river birch
Campsis radicans (L.) Seemann	trumpet vine
Carpinus caroliniana Walt.	ironwood or American hornbeam
Carya carolinae septentrionalis	southern shagbark hickory
Carya cordiformis (Wang.) K. Koch	bitternut hickory
Carya glabra (Mill.) Sweet	pignut hickory
Carya ovalis (Wang.) Sarg.	red hickory
Carya ovata (Mill.) K. Koch	shagbark hickory
Carya tomentosa Nutt.	mockernut hickory
Castanea pumila Mill.	Allegheny chinkapin
Catalpa bignonioides Walt.	southern catalpa
Ceanothus americanus L.	New Jersey tea
Celtis laevigata Willd.	sugarberry
Cephalanthus occidentalis L.	common buttonbush
Cercis canadensis L.	eastern redbud
Chionanthus virginicus L.	fringetree
Cornus amomum Miller	silky dogwood
Cornus florida L.	flowering dogwood
Corylus americana Walter	American hazel
Corylus cornuta Marsh.	beaked hazel
Crataegus sp.	hawthorn
Diospyros virginiana L.	common persimmon
Euonymus americanus L.	strawberry bush

Scientific Name	Common Name
Fagus grandifolia Dherh.	American beech
Fraxinus americana L.	white ash
Fraxinus pennsylvanica Marsh.	green ash
Gleditsia triacanthos L.	honeylocust
Hamamelis virginiana L.	witch-hazel
Hydrangea arborescens L.	wild hydrangea
Ilex decidua Walt.	possumhaw
Ilex opaca Ait.	American holly
Juglans nigra L.	black walnut
Juniperus virginiana L.	eastern redcedar
Kalmia latifolia L.	mountain-laurel
Ligustrum sp.	privet
Lindera benzoin (L.) Blume	spicebush
Liquidambar styraciflua L.	sweetgum
Liriodendron tulipifera L.	tulip tree or yellow-poplar
Lonicera japonica Thunberg	Japanese honeysuckle
Lonicera sempervirens L.	trumpet honeysuckle
Magnolia tripetala L.	umbrella magnolia
Malus pumila Mill.	apple
Melia azedarach L.	chinaberry
Morus rubra L.	red mulberry
Myrica cerifera	wax myrtle
Nyssa sylvatica Marsh.	black gum or black tupelo
Ostrya virginiana (Mill.) K. Koch	eastern hophornbeam
Oxydendrum arboreum (L.) DC	sourwood
Parthenocissus quinquefolia	Virginia creeper
Paulownia tomentosa (Thunb.) Sieb. & Zucc.	royal paulownia
Pinus echinata Mill.	shortleaf pine
Pinus serotina Michx.	pond pine
Pinus taeda L.	loblolly pine
Pinus virginiana Mill.	Virginia pine
Platanus occidentalis L.	American sycamore
Prunus angustifolia Marsh.	Chickasaw plum
Prunus serotina Ehrh.	black cherry
Pueraria lobata (Willd.) Ohwi	Kudzu

Scientific Name	Common Name
Quercus alba L.	white oak
Quercus coccinea Muenchh.	scarlet oak
Quercus falcata Michx.	southern red oak
Quercus marilandica Muenchh.	blackjack oak
Quercus michauxii Nutt.	swamp chestnut oak
Quercus nigra L.	water oak
Quercus phellos L.	willow oak
Quercus prinus L.	chestnut oak
Quercus rubra L.	northern red oak
Quercus stellata Wangenh.	post oak
Quercus velutina Lam.	black oak
Rhododendron sp.	azalea
Rhus copallina L.	shining sumac
Rhus glabra L.	smooth sumac
Rhus radicans L.	poison ivy
Robinia pseudoacacia L.	black locust
Rosa sp.	wild rose
Rubus sp.	blackberry
Salix nigra Marsh.	black willow
Sambucus canadensis L.	American elder
Sassafras albidum (Nutt.) Nees	sassafras
Smilax sp.	greenbriar
Sorbus arbutifolia (L.) Heynhold	red chokeberry
Staphylea trifolia L.	American bladdernut
Styrax grandifolia Ait	bigleaf snowbell
Symplocos tinctoria (L.) L'Her.	common sweetleaf
Tilia heterophylla Vent.	white basswood
Tsuga canadensis (L.) Carr.	eastern hemlock
Ulmus alata Michx.	winged elm
Ulmus americana L.	American elm
Ulmus rubra Muehl.	slippery elm
Vaccinium arboreum Marsh.	tree sparkleberry
Vaccinium sp.	blueberry
Vibrunum acerifolium L.	maple-leaved viburnum
Viburnum dentatum L.	southern arrow-wood
Viburnum prunifolium L.	blackhaw
Viburnum rufidulum Raf.	rusty blackhaw
Vitis sp.	grape

APPENDIX 5

Region J Concurrence

THE RESEARCH TRIANGLE REGIONAL PLANNING COMMISSION

CLARENCE D. JONES, Chairman
E. K. POWE, First Vice-Chairman
JAMES R. HINKLE, Second Vice-Chairman
HARVEY D. BENNETT, Secretary-Treasurer

ROBERT M. HANES MEMORIAL BUILDING
P. O. BOX 12255
RESEARCH TRIANGLE PARK, NORTH CAROLINA 27709
(Area Code 919) 549-0302
PEARSON H. STEWART, Executive Director

CHAPEL HILL • ORANGE COUNTY • DURHAM • DURHAM COUNTY • RALEIGH • WAKE COUNTY

October 31, 1972

RECEIVED
DEC 20 1972

Mr. Waverly Akins, Chairman
Wake County Commissioners
P. O. Box 266
Fuquay-Varina, North Carolina

Dear Waverly:

RE: A-95 Regional Review
Interceptor Outfalls to serve
the Upper Crabtree Creek Basin,
Wake County (Clearinghouse No.
72-0020)

At its regular meeting on October 24, 1972, the Research Triangle Regional Planning Commission voted unanimously to comment as follows concerning the above referenced project.

The sewer interceptor outfall proposed to serve the Upper Crabtree Creek will follow the Crabtree upstream to its confluence with Richland Creek, up Richland Creek to the vicinity of I-40, then generally westerly to the near vicinity of the Crabtree. Thereafter, the interceptor will follow the Crabtree to a point just south and west of the Town of Cary. This route goes around, rather than through, Umstead State Park.

The area to be served is one that holds promise of considerable development in the next several decades, development of various sorts including residential development at urban densities. The area, centered among Raleigh, Cary and the Research Triangle Park will come under the urbanizing influence of the places named. Soils in the Crabtree Basin are not suitable to development based both on septic tanks and on site water supply. Consequently, adequate wastewater collection and transmission lines and, eventually, an adequate water distribution system must be provided.

CHAPEL HILL HOWARD N. LEE, Mayor
JAMES C. WALLACE
RANGE COUNTY HARVEY D. BENNETT, County Board Chairman
CLARENCE D. JONES
OSCAR R. EWING
DURHAM JAMES R. HAWKINS, Mayor
E. K. POWE
DURHAM COUNTY DEWEY S. SCARBORO, County Board Chairman
W. W. EDWARDS
RALPH P. ROGERS, JR.
RALEIGH THOMAS BRADSHAW, Mayor
JAMES D. RAY
WAKE COUNTY GEORGE R. GOODWIN, JR., County Board Member
JAMES R. HINKLE
WILLIAM McLAURIN

The provision of treated water and the collection, treatment and disposal of wastewater in this area must involve the use of Raleigh's water supply and sewerage systems. Both Raleigh and Wake County are to be commended for their foresight that will enable the City and County to grow together.

The benefits and advantages of a regional utility system are difficult to over-emphasize. This proposed interceptor is adjudged a most acceptable addition to a Raleigh area regional utility system.

Cordially,

Pearson

Pearson H. Stewart

PHS:ns
cc: Joseph Sanders
William Carper
Mayor Thomas Bradshaw, Jr.
Benjamin Seymour

APPENDIX 6

Handout Distributed at the Corps of Engineers November 28, 1973 Public Meeting on the Crabtree Creek Study

Reference Section

This reference section is provided to furnish you with more information on the (1) problems and needs, (2) things which can be done, (3) study history, and (4) governing directives.

The explanations of the problems and needs and the things which can be done are listed by number and color-coded to correspond with the listings on pages 3 to 5. You, the public, are urged to review these lists and make further suggestions on the problems and needs and the things which can be done to solve them.

Explanations of Problems and Needs

Flood Damage

1. Determine extent of flooding: Where will flooding occur? How serious can it be? Will future development affect flooding? How much effect will the 11 Soil Conservation Service (SCS) structures have? How much flood control is desirable? (See the flood-plain maps included in this packet.)

2. Establish flood-plain regulations: Such regulations will facilitate future planning by delineating flood-prone areas. Upcoming decisions by the Raleigh City Council on flood regulations will affect this study.

3. Promote 11 SCS structures: There is lack of public support for these dams which will reduce flooding throughout the study area. While 11 dams are proposed and funded, three have been completed, and there has been some difficulty in acquiring easements to build the rest.

4. Remove old dam ruins (Anderson Drive): These old ruins cause increased flooding just upstream. Adjacent owners support removal.

5. Clean up stream: There is a need for removal of minor obstructions to flow. Civic groups might take this on as a project.

Water Quality

6. Improve water quality: Should Crabtree Creek be used for swimming? What is involved to upgrade classification? A class "B" stream is suitable for swimming. Major improvements would be necessary to upgrade the stream from its present "C" classification to a "B" classification.

7. Control Erosion: New construction sites and other disturbed areas are sources of sediment entering the stream. What is the extent of this problem, and what can be done?

Open Space And Environment

8. Retain Lassiter's Mill dam: The dam has aesthetic, recreational, and historic value. There is strong citizen support for its retention.

9. Establish greenway system: There is citizen support for a connected park and trail system along the stream. There is also some landowner opposition. The city is now developing a plan.

10. Reclaim Nello Teer rock quarry: State law now requires a reclamation plan, and one exists. There are questions about the life of the quarry and whether it could and should be included in future plans for the stream.

11. Reclaim cutoffs left by channel changes: Where the channel has been straightened, there are old channel sections which are cutoff. They hold stagnant water and breed mosquitos.

12. Provide additional recreation areas: Should the full range of recreational activities be considered as possibilities for the area?

13. Preserve natural areas: Undeveloped areas, containing unusual or scarce plant or animal life should be preserved.

14. Protect environment during project implementation: During possible construction phases, measures should be undertaken to protect all aspects of the environment.

15. Protect fish and wildlife: Insure that fish and wildlife species are protected and that their future is secure.

General Considerations

16. Rights of landowners: The property rights of landowners are essential considerations in any plan.

17. Land use: Land use planning for the stream area should reflect consideration for plans in the general area.

18. Plans for the stream area will be evaluated for their economic, environmental, and social effects.

Explanations Of Things Which Can Be Done About Flooding

Non-Structural Measures

1. Establish flood-plain regulations and flood-insurance program: Flood-plain regulations prohibit building in the floodway and they permit building elsewhere only if the structures are elevated above the flood level (see No. 5). Communities which intend to establish flood-plain regulations become eligible to participate in the subsidized National Flood Insurance Program, which makes flood insurance available to existing property located in the flood plain where it was not previously.

2. Move out flood-threatened buildings: Remove from the flood plain any building which is likely to incur major damage from flooding, or act as a dam if left standing.

3. Re-develop threatened areas: Re-plan and re-build neighborhood and commercial districts so they will no longer be vulnerable to flooding. This can mean to build them higher, or to move them.

4. Build above the flood level: Build on "stilts", or fill the land to a safe level.

5. Establish an early-warning plan for floods: Provide for notification of each occupant of the flood plain when flooding is expected.

6. Establish an emergency evacuation plan: Provide for temporary evacuation of each flood-plain occupant, and perhaps some valuables, when flooding is expected.

7. Manage land to slow down surface flow: Promote gradual runoff of stormwater by techniques such as contour plowing and surface drainage in wide vegetated channels.

8. Clean up the stream: Remove debris, snags and other minor obstructions which cause water to back up in the stream channel.

9. Do nothing: Leave things as they are.

Structural Measures Outside The Study Area

10. Provide more temporary stormwater storage: Build more ponds or lakes which can hold back some of the floodwater for release later when the stream can take it without flooding. The 11 SCS structures are examples of this.

Explanations Of Things Which Can Be Done About Flooding (cont.)

11. Build small flood-retarding devices throughout watershed: Use suitable street crossings, park bridges, parking lots, and similar structures, as locations for small stormwater storage devices.

12. Do nothing: Do no structural work outside study area.

Structural Measures Within The Study Area

13. Floodproof buildings: Close all openings, temporarily or permanently, where floodwater can enter, treat walls to prevent seepage, provide valves on drains and sewer pipes, and use waterproof electrical wiring.

14. Modify bridges: Make bridges higher or longer so that floodwaters will not back up behind them.

15. Modify the channel: Straighten, widen, and/or smooth out critical segments of the channel in various combinations of ways so more water can be carried within the channel.

16. Divert main channel flood flow: Build an auxiliary floodway channel, one that is dry except at flood time, to carry floodwaters around critical stream segments.

17. Divert storm drainage: Intercept all or some of the storm drainage entering upstream from critical segments of the stream, and by-pass it downstream.

18. Build levees: Build grassy banks along the stream to contain a large flood within safe limits.

19. Build floodwalls: Build a narrow concrete wall along the stream to contain a large flood within safe limits.

20. Use Lassiter's Mill dam for flood control: Re-build flood gates in dam to lower flood elevation behind dam, or increase temporary storage capacity of lake behind dam.

21. Remove Lassiter's Mill dam: Remove the obstruction to flow in order to lower the flood level upstream.

22. Remove minor obstructions to flow: For example, remove old dam ruins near Anderson Drive.

23. Modify obstructing pipe lines: Relocate pipes and elevated manholes which exist above ground in the floodway where they collect debris and obstruct flow.

24. Remove channel sediment: Remove sandbars and other deposits where excess sediment deposits have reduced natural flow capacity.

25. Do nothing: Do no structural work within the study area.

Explanations Of Things Which Can Be Done About Water Quality

26. Build sediment traps: Construct basins, or small ponds, in which sediment will accumulate for periodic economical removal so that deposition in the stream will be reduced.

27. Stabilize streambanks: Make streambanks resistant to erosion and undercutting to cut off that source of sediment.

28. Remove channel sediment: Remove contaminated channel deposits.

29. Maintain minimum flow: Maintain sufficient flow during dry periods for the preservation of stream life and for the dilution of contaminants.

30. Manage land to release minimum pollutants: Control the release of pesticides, fertilizers, and other contaminants from land areas within the watershed.

31. Raise oxygen content of streams: Increase the amount of dissolved oxygen available to fish and other streamlife by installing artificial rapids, or by mechanically bubbling air through the water.

32. Upgrade stream classification: A higher stream classification will limit stream uses which degrade water quality.

33. Establish sediment control ordinance: By limiting the quantity of sediment released from land under construction, the quantity of sediment which reaches the stream is correspondingly reduced.

34. Stop untreated waste discharge: Insure that no inadequately treated municipal, commercial, or industrial wastes are released to the stream system.

35. Route urban runoff through vegetated strip: Create vegetated areas near the stream across which storm drainage can flow in thin sheets. Natural filtering action will improve water quality.

36. Collect worst urban runoff and by-pass downstream: By routing particularly poor-quality surface runoff downstream, some segments of the stream can enjoy higher quality.

37. Collect worst urban runoff and treat it in a plant: Transfer poor-quality surface runoff to a treatment plant, either a conventional sewage plant or a special one for stormwater.

38. Collect worst urban runoff and treat it in the interceptor lines: Install treatment devices in the collecting lines to improve water quality before release.

Explanations Of Things Which Can Be Done About Water Quality (cont.)

39. Install treatment ponds for urban runoff: Build treatment ponds to allow contaminants to settle or be consumed before reaching the stream.

40. Do nothing: Take no action regarding water quality.

Explanations Of Things Which Can Be Done About Open Space And Environment

41. Retain Lassiter's Mill dam: Preserve the dam, but do not re-build the mill.

42. Establish greenway trail system: Provide a system of parks, nature walks, bike trails, and other trails along the stream.

43. Provide additional recreation activity: Develop a variety of facilities in or near the flood plain for recreation.

44. Preserve natural areas: Select representative or unusual natural areas for preservation in their natural state.

45. Beautify the landscape: Execute a program of regrading, planting, and otherwise enhancing the general view along the stream.

46. Operate fish and wildlife programs: Establish, stock, and maintain habitats for fish, birds, and animals along the stream.

47. Protect environment during project implementation: Reserve and protect resources which are part of final plan. Manage any construction with minimum environmental effect.

48. Clean the entire stream area: Remove refuse and debris from the entire stream area.

49. Beautify man-made structures: Modify or hide distractive structures in the stream area such as sewer lines, manholes, and bridges.

50. Promote beautification program by landowners: Provide free education, coordination, and advice to landowners as to how to improve their streamside property.

51. Re-claim abandoned facilities: Re-claim mined-out quarries. Restore or modify cut off stream meanders. Include otherwise unusable properties.

52. Do nothing: Take no action regarding open space and environmental needs.

APPENDIX 7

Wake County Plan of Action

RESOLUTION
TO ADOPT A PLAN OF ACTION TO MANAGE LAND USES AND PUBLIC FACILITIES WITHIN THE UPPER CRABTREE CREEK WATERSHED* FOR THE PURPOSE OF MINIMIZING INCREASES IN FLOOD DAMAGES AND SEDIMENTATION

WHEREAS, the Board of Commissioners of the County of Wake is cognizant of the fact that recent floods - - of a magnitude which occur about once every fifteen years - - did cause extensive damage to properties located along Crabtree Creek downstream from Umstead State Park; and

WHEREAS, the Board is aware that conversion of land from rural to urban-type uses, hereafter referred to as development, causes increases in the volume and velocity of surface runoff of rainwater, because impervious materials such as roofs and pavement reduce absorption of water into the ground; and

WHEREAS, the Board is likewise aware that extension of water and sewerage systems into the upper Crabtree Creek watershed will encourage and facilitate development of land, especially in view of the proximity of the watershed to the Research Triangle Park, the Raleigh-Durham Airport, aesthetic attractiveness of the landscape, and U. S. Highway I-40; and

WHEREAS, the Board has officially adopted the Wake County Water and Wastewater Facilities Plan which proposes extension of utilities into the upper watershed as an immediate need; and

WHEREAS, of the nine impoundments proposed as flood control structures in the upper Crabtree Creek watershed, as parts of the Crabtree Creek flood control project, only three have been completed, and unless significant changes are initiated, the remaining structures may require up to eight and a half years to build; and

WHEREAS, the Board realizes that completion of major sewer outfalls prior to completion of flood control programs may cause an increase in flood and erosion intensity as a consequence of development,

NOW, THEREFORE, the Board of Commissioners resolves, That a plan of action is necessary to coordinate public works and private development within the upper Crabtree Creek watershed to provide reasonable assurance that there will be no increase in the probability of flood damages or in the extent of sedimentation as a result of development prompted by sewer-line construction.

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*Upper Crabtree Creek watershed is here defined as that portion of the watershed upstream of Crabtree Valley Mall

FURTHER, the Board of Commissioners resolve that the plan of action shall include the following elements:

I. Complete the geophysical study of soils, topography, etc. started in September, 1973 by the Wake County Planning Department to determine:

  A. Existing drainage characteristics of the land;

  B. Effects of future development related to increase in surface runoff, flood elevations, and sedimentation . . .

    1. with existing flood retention structures,

    2. with existing land use regulations,

    3. with additional flood retention structures in place;

  C. Maximum amount of impervious surfaces within the watershed under various conditions, such as listed under B. above;

  D. What changes in land use regulations will be necessary to prevent increase in probability of flood damage or sedimentation.

II. Expedite initiation of flood plain and erosion control regulations in coordination with the work of the Raleigh-Wake County Land Use Code Committee and the U. S. Environmental Protection Agency's proposed "208 planning program, in the event the latter goes into effect.

III. Explore possibilities of new approaches to reduce the time required to complete the system of dams and flood control impoundments in the Crabtree Creek Watershed Project from seven and a half years to a shorter period.

In any event, expedite completion of the Project as soon as possible.

IV. Apply existing County land use regulations and health regulations to help minimize development impact, to the extent possible, and to encourage developers to employ, voluntarily, runoff and sediment control techniques.

V. Coordination of sewer extension timing with: (1) Progress on the Crabtree Creek Watershed Project; (2) completion of the study described in element I, above; (3) and enactment of new land-use regulations, as required, in such manner that extension of sewers will not initiate, encourage, or facilitate untimely, large-scale development which would increase the probability of flood damage or degree of sedimentation.

In adoption of this policy the Wake County Board of Commissioners take note of and call attention to the fact that its plan of action cannot, alone, accomplish all desired public purposes. Intergovenmental cooperation and coordination will also be required.

For example, the role of the County in extension of a major sewer interceptor into the upper Crabtree Creek basin is chiefly that of funding. The County of Wake has entered into contractual agreements with the City of Raleigh and the Town of Cary whereby, within established geographic bounds, known as "perimeter areas," those municipalities will assume responsibility for installation, maintenance and management of water and wastewater utility systems. The County may or may not provide financial assistance in providing major lines and treatment facilities, and to that extent the County may play a part in the timing of capital improvement programs.

Further, the Commissioners are aware that whereas extension of a major sewer interceptor into the upper basin of Crabtree Creek will induce development, it is not likely that such development will begin on a significant scale until contracts for the project have been awarded and construction is under way. It is reasonable to anticipate that developers may begin grading and land preparation activities at approximately the same time work begins on the interceptor. Erosion, sedimentation and flooding problems customarily accompany such activities. However, the Commissioners intend to have an erosion control ordinance in effect by that time.

Completion of the entire interceptor, however, will require up to four and a half years which corresponds to the most optimistic estimate of the length of time required for completion of the nine flood control impoundments upstream of State Road 1649 (Ebenezer Road).

Four major activities will be carried on simultaneously within the upper basin:

1. Construction of the Crabtree Creek interceptor;
2. Construction of flood control impoundents;
3. Private land development dependent upon public sewerage facilities (the interceptor);
4. Private land development dependent upon private sewage treatment facilities.

Elements of the plan of action outlined above, must be applied with proper timing in order to be most effective. The Commissioners estimate the following sequence of activities and events governmental and private, which may affect flood damage probability; the kind of problems that may result; and the action to be taken by the Commissioners to minimize undesirable consequences.

YEAR 1974

Governmental activities and events:

1. County: Completion, Element I - - geophysical study of upper Crabtree Creek watershed - - including amendment of Zoning Ordinance to regulate surface coverage of land by impervious materials.
2. County: Preparation of flood plain and erosion control ordinances for adoption either as separate ordinances or for incorporation into the Zoning Ordinance. (Element II) (adoption of erosion control ordinance might be delayed by changes made in State law and policies during the current session of the General Assembly.)
3. County:
   - (a) Acceleration of land acquisition for proposed impoundments.
   - (b) Expedite progress on two impoundments (sites I and 13), one under construction and one for which funds are now available.
   - (c) Revise Crabtree Creek Watershed Project in attempt to fund and schedule simultaneous construction of all impoundments - - a crash program - - to effect completion of the project at least by the middle of 1978 and sooner if possible.
4. Preparation of comprehensive plan and completely revised land use code system for County.
5. City of Raleigh:
   - (a) Construction of new sewage treatment plant by City of Raleigh.
   - (b) Construction by City of main interceptor from new treatment plant, up Neuse River and Crabtree Creek, to existing pumping station on Crabtree Creek where existing outfall along the Creek now terminates.

Completion of these two elements is necessary before the proposed upper basin interceptor (E.P.A. Project C370344) can serve the area. Completion is scheduled for February, 1976.

6. City of Raleigh and Town of Cary: Start of construction of Cary water storage tank (1 or 2 million gallons) and water main extension from Raleigh to Cary - - 1½ to 2 years required for completion. Significance: Extensive development in upper Crabtree basin depends upon public water system; groundwater resources generally very poor.
7. Federal, Environmental Protection Agency: Hopefully, award of $2.6 million grant, E.P.A. Project C370344 for Crabtree Creek Sewer Interceptor.

Private Activities:

1. Sporadic development within upper basin mostly single-family dwelling units; limited by groundwater resources; suitability of soils for septic tanks; capability of streams to receive effluent from private treatment plants (package plants).
2. Submission of petitions by property owners, to amend zoning map to permit developments anticipating availability of public water and sewer facilities.
3. Some unauthorized land-disturbing activities - - grading, road building - - in preparation for development.

Potential problems accruing from private action:

In reference to numbers immediately above . . .

(1) Some increase in surface runoff, erosion, and sedimentation but probably not significant amount in 1974.
(2) Arbitrary rezoning may make water and land management much more difficult later;
(3) Land disturbance without proper authorization may not only aggravate water management problems but also tends to commit developers to projects they may not be able to complete under existing or proposed land use regulations; vested rights may not accrue from their actions.

County action to minimize undesirable consequences:

In reference to numbers above . . .

(1) (a) Strict enforcement of land use regulations.
    (b) Encourage County and State public health agencies to do likewise with public health regulations.
    (c) Encourage strict policy in reference to issuance of permits for private treatment plants (Presently, Crabtree Creek and its tributaries have a capacity to receive treated effluent from a maximum population of 3,000 at 3/4 dilution ratio.) This is a function of the N. C. Office of Water & Air Resources.

(2) Application of policy which would maintain existing zoning unless petitioner can present evidence which demonstrates that existing zoning was applied in error or that circumstances have so changed since existing zoning was applied that the Ordinance must be changed in the public interest. Further, that evidence submitted in support of petition must be more than fairly debatable in order to overcome presumption of validity of existing zoning. Such policy is in keeping with basic legal principles protecting the public and private interests against arbitrary, capricious, discriminatory, confiscatory, legislative and discretionary abuse.

(3) Enforcement of existing ordinance requiring permit prior to land disturbing activities.

YEAR 1975

Governmental activities and events:

County: (1) Land use regulations in effect governing ratio of impervious materials area to gross acreage of land within the watershed. These regulations will be based upon quantitative data determined in the geophysical study, Element I above. Regulation of the amount of impervious materials used in development can control surface runoff to the extent that, when all proposed flood control structures of the watershed project are in place, flooding from a 100-year storm would be less than would occur in runoff from the same land in its natural condition during a 100-year storm. Without the complete system of dams in place, increase in runoff resulting from development may be controlled by:

- (a) regulation of amount of impervious land cover;
- (b) requiring private, on-site retention structures and landscaping designed to retard runoff; and
- (c) enforcement of flood plain and erosion control ordinances.

(2) **County:** Accelerated work on construction of impoundments.

(3) **City-County:** Land acquisition and construction of inceptor into upper Crabtree Creek basin.

(4) **Raleigh:**

- (a) Completion of sewer interceptor from Crabtree Creek pumping station to treatment plant site.
- (b) Construction of sewage treatment plant.

(5) **Cary-Raleigh:** Construction of water main from Raleigh to Cary and elevated tank in Cary.

(6) **County-Raleigh:** Completion of comprehensive plans and revised land use code -- new planning system.

(7) **Raleigh-Durham Airport Authority:** Construction of new 10,000 runway. (Erosion and flood retention controls are integral parts of the airport expansion plans.) FAA approval of environmental impact statement pending.

Private activities:

(1) When the upper Crabtree Creek basin interceptor becomes a definite, firm project, considerable development activity will probably start, including several projects involving 100 acres or more.

(2) Numerous petitions to change zoning within the Crabtree Creek headwaters area will probably be filed.

County action to minimize undesirable consequences:

In reference to numbers above:

(1) (a) Land use controls will be in effect, as outlined above, to control development characteristics. Enforcement will be accomplished by means of a land use code that integrates and coordinates zoning, subdivision regulations, use of flood plains, erosion and sedimentation regulation, and change in ratio of permeable area to impermeable ground cover.

(b) Implementation of land use policies, to the extent possible in keeping with the rights of property owners, to preclude extensive surface runoff in any subbasin prior to completion of adequate public or private flood retention structures downstream.

(c) Assignment of construction priorities to impoundments downstream of areas likely to develop first. For example, assuming that the interceptor from the vicinity of Oak Park subdivision, up Richland Creek to Interstate-40 highway, will be completed first, it becomes imperative that flood retention structure number eleven on Richland Creek be completed as soon as possible. Similarly, during 1975 priorities should be assigned to impoundments downstream of tracts of land known to be "ripe" for major development.

YEAR 1976

Governmental activities and events:

1. County: All land-use controls described above will be in effect.
2. County: Construction of sewer interceptor system proceeding.
3. County: Construction of impoundments in Crabtree Creek Watershed Project proceeding, either simultaneously or on priority basis in coordination with completion of segments of the interseptor.
4. Raleigh: New sewage treatment plant completed. Sewage from connections in the Crabtree Creek basin may then proceed by gravity flow to the new treatment plant.
5. Cary-Raleigh: Completion of water main from Raleigh to Cary and completion of Cary's elevated storage tank.
6. Raleigh-Durham Airport Authority: Construction of 10,000 runway.
7. Triangle-J Council of Governments: Probable completion of of Areawide Waste Treatment Management Planning Process plan, E.P.A. "208" project.

Private Activities:

1. Probable acceleration of development anticipating public water supply from Cary and eventual availability of public sewerage facilities.

Governmental action to minimize undersirable consequences:

In reference to numbers above:

(1) Application of policies and land use regulations outlined above, all ordinances strictly enforced, and coordination of public and private activities to effect water management through the mechanism of a comprehensive planning program and day-to-day operational decisions.

Municipal activities to minimize undesirable consequences:

WHEREAS, the County Commissioners can not speak for the City of Raleigh or Town of Cary, it is appropriate in this plan of action to mention that both municipalities may play a leading role by using sewer and water extension policies to help guide development into the proper places at the proper time. Officials are aware of the need. Intergovernmental coordination is expected.

YEARS 1977 through 1978

Governmental activities and events:

1. County: Construction of sewer interceptor and flood retention structure systems will proceed simultaneously. Both, according to optimistic estimates, may be completed during 1978.

2. Raleigh-Durham Airport Authority: Extensive construction activity related to Airport expansion program, involving very large-scale earthmoving. (The Authority has recognized, in advance, potential runoff and sedimentation problems and have included on-site control and abatement techniques in engineering plans.)

3. Implementation of revised comprehensive plans and regulations steming from the work of the Raleigh-Wake County Land Use Code Committee. The problem of possible increase in flooding resulting from sewer-induced development will likely be reduced through the application of a comprehensive plan-based system of land use regulations as part of a code that also includes articles of procedure designed to provide maximum resistance to attempts to change plans or amend regulations in an arbitrary, capricious, discriminatory, or otherwise unlawful manner.

Private activities

Development of land within the watershed will likely proceed apace. Completion of major development such as industrial parks, planned communities, shopping centers, etc. will coincide approximately with completion of the interceptor and impoundment systems.

Governmental activities to minimize undersirable consequences:

1. Continued application of policies and regulations outlined above.

SUMMARY

WHEREAS, this plan of action acknowledges that private development of the upper Crabtree Creek watershed will be stimulated by the prospect of public sewage facilities, and that such development would, if uncontrolled, increase the amount of flood damage both within the headwaters and downstream, the Commissioners feel reasonably assured that such a threat to the public health, safety, and general welfare need not, and probably will not, materialize if this plan of action is conscientiously carried out.

THEREFORE, the Board of Commissioners of Wake County do hereby declare by resolution its intent to administer this plan of action to the best of its ability.

The date of effect of this resolution shall be from and after its passage.

RESOLUTION

WHEREAS, the Wake County Board of Commissioners recognizes a great need to control soil erosion and sedimentation and those activities which result in erosion and sedimentation within Wake County; and

WHEREAS, the Wake County Board of Commissioners recognizes the need to establish a county-wide erosion and sediment control program; and

WHEREAS, the North Carolina General Assembly through Chapter 392 of the Session Laws of North Carolina, 1973, and other laws, has delegated to local governments the power to control such erosion and sedimentation; and

WHEREAS, the Wake County Board of Commissioners desires to exercise such power.

NOW, THEREFORE, BE IT RESOLVED BY THE WAKE COUNTY BOARD OF COMMISSIONERS, that the following ordinance be adopted:

AN ORDINANCE TO PROVIDE FOR THE CONTROL OF SOIL EROSION AND SEDIMENTATION

ARTICLE I

Section 1. TITLE

This ordinance shall be known and may be cited as the Erosion and Sedimentation Control Ordinance of Wake County.

Section 2. JURISDICTION

(1) This ordinance is hereby adopted by the Wake County Board of Commissioners to apply to all of Wake County outside of the incorporated areas and their extraterritorial jurisdiction. However, this ordinance may apply within the incorporated areas or the extraterritorial jurisdictional areas of municipalities upon proper resolution by the governing bodies of the respective municipalities and agreement by the Wake County Board of Commissioners.

(2) Notwithstanding the provisions of G.S. 113A-56(4) and Article II, Section 3(2)(d) of this ordinance, the Wake County Board of Commissioners hereby declares the intent that all the departments and agencies of the County and its contractors and subcontractors shall comply with the regulations of this ordinance where they are more restrictive than similar regulations of the North Carolina Sediment Control Commission.

(3) The Wake County Department of Natural Resources shall provide assistance to the Wake Soil and Water Conservation District to review and comment on sediment control plans.

(4) The Wake County Department of Natural Resources shall be responsible for approval, issuance of permits related to, and enforcement of sediment control plans.

(5) The Director of the Wake County Department of Natural Resources shall annually furnish the Wake County Board of Commissioners personnel, equipment, space, and budget needs to implement this program.

ARTICLE II

Section I. PURPOSES

This ordinance is adopted for the purposes of:

(1) regulating land-disturbing activities to prevent unnecessary soil erosion and sedimentation in order that water pollution from sedimentation may be controlled, that the obstruction of natural and artificial drainage ways may be prevented, and that flooding may be inhibited.

(2) establishing procedures through which these purposes can be fulfilled.

Section 2. DEFINITIONS

As used in this ordinance, unless the context clearly indicates otherwise, the following definitions apply:

(1) Active Construction - means activities which contribute directly to the completion of facilities contemplated or shown on the construction plans.

(2) Adequate Erosion Control Measure, Structure, or Device - means one which controls the soil material within the land area under responsible control of the person conducting the land-disturbing activity.

(3) Buffer Zone - means the strip of land adjacent to a lake or natural watercourse, the width of which is measured from the edge of the water to the nearest edge of the disturbed area, with the twenty-five percent (25%) of the strip nearer the land-disturbing activity containing natural or artificial means of confining visible siltation.

(4) District - means the Wake Soil and Water Conservation District created pursuant to Chapter 139, North Carolina General Statutes.

(5) Erosion - means the wearing away of land surface by the action of wind, water, gravity, or any combination thereof.

(6) Ground Cover - means any natural vegetative growth or other material which renders the soil surface stable against accelerated erosion.

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(7) Lake or Natural Watercourse - means any stream, river, brook, swamp, sound, bay, creek, run, branch, canal, waterway, estuary, and any reservoir, lake or pond, natural or impounded, in which sediment may be moved or carried in suspension, and which could be damaged by accumulation of sediment.

(8) Land-disturbing Activity - means any use of the land by any person in residential, industrial, educational, institutional, or commercial development, highway and road construction and maintenance that results in a change in the natural cover or topography and that may cause or contribute to sedimentation.

(9) Person Engaged in or Conducting Land-disturbing Activity - means the individual, partnership, firm, association, joint venture, public or private corporation, trust, estate, commission, board, public or private institution, utility, cooperative, interstate body, or other legal entity, financially responsible for the land-disturbing activity.

(10) Plan - means erosion and sedimentation control plan.

(11) Protective Cover - means natural or artificial ground cover of grass, trees, shrubs, or mulch sufficient to reduce erosion potential to within allowable limits.

(12) Sediment - means solid particulate matter, both mineral and organic, that has been or is being transported by water, air, gravity, or ice from its site of origin.

(13) Siltation - means sediment resulting from accelerated erosion which is settleable or removable by properly designed, constructed, and maintained control measures; and which has been transported from its point of origin within the site of a land-disturbing activity; and which has been deposited, or is in suspension in water.

(14) Tract - means all contiguous land and bodies of water in one ownership, or contiguous land and bodies of water in diverse ownership being developed as a unit, although not necessarily all at one time.

(15) Uncovered - means the removal of ground cover from, on, or above the soil surface.

(16) Undertaken - means the initiating of any activity, or phase of activity, which results or will result in a change in the ground cover or topography of a tract of land.

(17) Working Days - means days exclusive of Saturday or Sunday during which weather conditions permit land-disturbing activity to be undertaken.

Section 3. SCOPE AND EXCLUSIONS

(1) This ordinance shall apply to land-disturbing activities undertaken by any person, with the following exclusions:

(a) Land-disturbing activities undertaken on agricultural land for the production of plants and animals useful to man but not limited to: forage and sod crops, grain and feed crops, tobacco, cotton, and peanuts; dairy animals and dairy products; poultry and poultry products; livestock, including the breeding and grazing of any or all such animals; bees and apiary products; and fur animals.

(b) Land-disturbing activities undertaken on forest land for the production and harvesting of timber and timber products.

(c) Land-disturbing activities undertaken by persons who are otherwise regulated by the provisions of G.S. 74-46 through G.S. 74-68, the Mining Act of 1971.

(2) This ordinance shall not apply to the following land-disturbing activities, as such activities are subject to the control of the North Carolina Sediment Control Commission.

(a) Land-disturbing activities conducted by the State.

(b) Land-disturbing activities conducted by the United States.

(c) Land-disturbing activities conducted by persons having the power of eminent domain.

(d) Land-disturbing activities conducted by local governments.

(e) Land-disturbing activities licensed by the State or the United States.

(f) Land-disturbing activities funded in whole or in part by the State or the United States.

Section 4. PERMITS

Except as provided in Section 3 herein, it shall be unlawful to conduct any land-disturbing activity without first obtaining a permit from the County. Permits may be obtained upon submitting a soil erosion and sedimentation control plan and the application, fees and security deposit prescribed by the County and by obtaining approval of the proposed project. No permit shall be issued until such time as the County is assured that the proposed land-disturbing activity will be carried out in accordance with the proposed soil and sedimentation control plan. A certificate of preliminary erosion control compliance shall be issued, indicating that initial soil erosion and sedimentation controls have been installed. This certificate shall be issued prior to the approval by the County of an application for building construction in the County, in any of the incorporated areas of the County, or extra-territorial jurisdictional areas of the municipalities of the County subject to this ordinance.

No permit shall be required for the following land-disturbing activities.

(1) Those done for the purpose of fighting fires.

(2) The stockpiling of raw or processed sand, stone, or gravel in concrete, asphalt, and material processing plants and storage yards, provided that sediment control measures have been utilized to protect against off-site damages.

(3) Land-disturbing activities at any one time, on any one tract, by any person or persons that do not exceed one acre in surface area.

Section 5. APPROVAL OF PLANS

(1) A copy of each final soil erosion and sedimentation control plan shall be submitted to the Wake Soil and Water Conservation District at the same time a copy thereof is submitted to the Wake County Department of Natural Resources for approval. The Wake Soil and Water Conservation District, within 20 days after receipt of the proposed plan, or within such additional times as may be prescribed by the Board of County Commissioners, shall review the soil erosion and sedimentation control plan and submit its comments and recommendations to the Wake County Department of Natural Resources. Failure of the Soil and Water Conservation District to submit its comments and recommendations within 20 days or within the prescribed additional time shall not delay final action on the proposed plan by the Wake County Department of Natural Resources.

(2) The Wake County Department of Natural Resources, within 30 days of receipt of each soil erosion and sedimentation control plan submitted to it, shall notify the person submitting the plan that it has been approved, approved with modifications, or disapproved. No plan shall be approved unless and until it complies with all applicable State and County regulations for soil erosion and sediment control.

(3) Application for amendment of an erosion control plan in written and/or graphic form may be made at any time under the same conditions as the original application. Until such time as said amendment is approved by the Wake County Department of Natural Resources, the land-disturbing activities shall not proceed except in accordance with the erosion control plan as originally approved.

Section 6. INSPECTIONS

(1) Agents and officials of the County may inspect the sites of land-disturbing activities for which permits have been issued at reasonable times to determine whether the activities are being conducted in accordance with the plan and to determine whether the measures required in the plan are effective in controlling erosion and sediment resulting from land-disturbing activities. Notice of the County's right to make such inspections shall be included in the certificate of the plan's approval.

(2) If, through inspection, it is determined that a person engaged in land-disturbing activities has failed to comply with the approved plan, a notice to comply shall be served upon that person by registered mail. The notice shall set forth the measures necessary to achieve compliance with the plan and shall state the time within which such measures must be completed. If the person engaged in the land-disturbing activities fails to comply within the time specified, he shall be deemed in violation of this ordinance.

Section 7. FEES

The fees charged by the County for the administration and enforcement of this ordinance shall be prescribed by the Wake County Board of Commissioners.

Section 8. APPEALS

(1) The disapproval or modification of any proposed erosion control plan by the County shall entitle the person submitting the plan to a public hearing before the Director of the Wake County Department of Natural Resources if such person submits written demand for a hearing within 15 days after receipt of written notice of the disapproval or modification.

(2) Hearings held pursuant to this Section 8(1) above shall be conducted within 30 days after receipt of the request and notice of such hearing shall be published at least once, in a local newspaper not less than seven (7) days before the date of the hearing.

(3) The Director shall make his recommendation to the Commissioners of Wake County within five days after the date of the hearing.

(4) The Wake County Commissioners shall render its decision on any erosion control plan for which a hearing is requested at one of its next two regular meetings.

Section 9. STANDARDS

(1) All uncovered areas existing on the effective date of this ordinance shall be provided with protective cover within 90 days after the effective date of this ordinance unless an extension of time is granted.

(2) All areas uncovered subsequent to the effective date of this ordinance shall be provided with protective cover within 60 days after commencement of land-disturbing activities, unless a longer or shorter time is specified in the permit or unless an extension of time is granted, provided that in no instance shall the establishment of protective cover be delayed more than 30 working days after the completion of any disturbance of land upon which further active construction is not being undertaken.

(3) Upon the identification and illustration by the County Commissioners of those portions of each property adjoining or tangent to a natural watercourse or to a public water impoundment area, upon which building is proposed, required by G.S. 113A-57(1) to remain as buffer zones, such buffers shall be provided of such length, width, and design to control, detain, or confine sedimentation consistant with the provisions of this ordinance. This standard shall not be construed to require the dedication of such buffer zones to public use, without due process of law, including just compensation.

(4) After the completion of construction on each land-disturbing site to which this ordinance applies, provisions shall be made, on or off the site, for the impoundment, during storms, of that quantity of the natural liquid runoff from the site which is equal to the calculated difference between the amount of runoff which would result from a two (2) year frequency storm on that land if it were zoned and developed for residential purposes at a density no greater than four (4) families per acre and that which would result from a storm of the same frequency on the same land if developed to the degree for which it is actually zoned; provided, no impoundment shall be required of runoff from sites developed for residential purposes at a density of four (4) families per acre or less; provided further, part of the space, including parking areas, otherwise required by law to be left open, may be jointly used to satisfy the impounding

requirements herein; provided still further, this standard shall not apply to sites of five (5) acres or less in size unless such site is part of a larger subdivision or other project area which, when fully developed, will generate a more significant amount of runoff. All calculations and plans for impoundment structures and areas must receive the approval of the Wake County Department of Natural Resources before any building permit may be issued.

(5) During construction, the planned soil erosion and sedimentation control practices and devices shall be employed to restrict sedimentation soil losses from each land-disturbing site in accordance with plans approved by the Wake County Department of Natural Resources. Such erosion and sedimentation control measures, structures, and devices shall be so planned, designed, and constructed as to provide control from the calculated peak rates of runoff from a ten-year frequency storm. Runoff rates shall be calculated using the procedures in the USDA, Soil Conservation Service's "National Engineering Field Manual for Conservation Practices", or other acceptable calculation procedures. Runoff computations shall be based on rainfall data published by the National Weather Service for the area.

(6) Following the completion of construction, provisions shall be made to limit calculated, anticipated annual soil losses from unpaved areas of developed sites to two (2) tons per acre or less per year and not to exceed four (4) tons per acre from any unpaved sloping area following the completion of construction using the Universal Soil Loss Prediction Equation with the adopted standard factors as a guide.

(7) All soil erosion and sedimentation control plans and measures shall conform to the minimum applicable standards specified in the Wake Soil and Water Conservation District's Standards and Specifications for Soil Erosion and Sediment Control in Urbanizing Areas as adopted by the Wake County Board of Commissioners and amended and supplemented from time to time. A copy of the current Standards and Specifications shall remain, at all times, on file in the office of the Director of the Wake County Department of Natural Resources.

(8) The angle for graded slopes and fills shall be no greater than the angle which can be retained by vegetative cover or other adequate erosion control devices or structures. In any event, slopes left exposed will, within 30 working days

of completion of any phase of grading, be planted or otherwise provided with ground cover, devices, or structures sufficient to restrain erosion.

Section 10. PENALTIES

A. Civil Penalties

(1) Any person who violates any of the provisions of this ordinance, or rule or order adopted or issued pursuant to this ordinance, or who initiates or continues a land-disturbing activity for which an erosion control plan is required except in accordance with the terms, conditions, and provisions of an approved plan, shall be subject to a civil penalty of not more than $100. No penalty shall be assessed until the person alleged to be in violation has been notified of the violation. Each day of a continuing violation shall constitute a separate violation.

(2) The Wake County Board of Commissioners shall determine the amount of the civil penalty to be assessed under this subsection and shall make written demand for payment upon the person in violation, and shall set forth in detail a description of the violation for which the penalty has been imposed. In determining the amount of the penalty the Commissioners shall consider the degree and extent of harm caused by the violation and the cost of rectifying the damage. If the payment is not received or equitable settlement reached within 60 days after demand for payment is made, the matter shall be referred to the County Attorney for institution of a civil action in the name of the County, in the appropriate division of the General Court of Justice for recovery of the penalty. Any sums recovered shall be used to carry out the purposes and requirements of this ordinance.

B. Criminal Penalties

Any person who knowingly or willfully violates any provision of this ordinance, or rule or order adopted or issued pursuant to this ordinance, or who knowingly or willfully initiates or continues a land-disturbing activity for which an erosion control plan is required except in accordance with the terms, conditions, and provisions of an approved plan, shall be guilty of a misdemeanor punishable by imprisonment not to exceed 90 days, or by a fine not to exceed $5,000, or by both, in the discretion of the court.

Section 11. INJUNCTIVE RELIEF

(1) Whenever the Commissioners of Wake County have cause to believe that any person is violating or threatening to violate this ordinance or any rule or order adopted or issued pursuant to this ordinance, or any term, condition, or provision of an approved erosion control plan, they may, either before or after the institution of any other action or proceeding authorized by this ordinance, institute a civil action in the name of the County for injunctive relief to restrain the violation or threatened violation. The action shall be brought in the Superior Court of Wake County.

(2) Upon determination by a court that an alleged violation is occurring or is threatened, it shall enter such orders or judgments as are necessary to abate the violation or to prevent the threatened violation. The institution of an action for injunctive relief under this section shall not relieve any party to such proceeding from any civil or criminal penalty prescribed for violations of this ordinance.

Section 12. CIVIL RELIEF

(1) Any person injured by a violation of this ordinance, or of any rule, regulation, or order duly adopted by the Commissioners of Wake County, or by the initiation or continuation of a land-disturbing activity for which an erosion control plan is required other than in accordance with the terms, conditions, and provisions of an approved plan, may bring a civil action against the person alleged to be in violation. The action may seek:

a. Injunctive relief;

b. An order enforcing the ordinance or rule, regulation, order, or erosion control plan violated; or

c. Damages caused by the violation; or

d. Both damages and injunctive relief; or

e. Both damages and an enforcement order.

If the amount of actual damages as found by the court or jury in suits brought under this Section 12 is five hundred dollars ($500) or less, the plaintiff shall be awarded double the amount of actual damages. If the amount of actual damages as found by the court or jury is greater than five hundred dollars ($500), the plaintiff shall receive damages in the amount so found.

(2) Civil action under this Section 12 shall be brought in the Superior Court of Wake County. The court, in issuing any final order in any action brought pursuant to this Section 12 may award costs of litigation (including reasonable attorney and expert witness fees) to any party, whenever it determines that such an award is appropriate. The court may, if a temporary restraining order or preliminary injunction is sought, require the filing of a bond or equivalent security, the amount of such bond or security to be determined by the court.

(3) Nothing in this Section 12 shall restrict any right which any person (or class of persons) may have under any statute or common law to seek injunctive or other relief.

ARTICLE III

Section 1. Nothing in this ordinance shall restrict any right which any person or class of persons may have under any statute or common law to seek injunctive or other relief.

Section 2. If any provision of this ordinance or the application thereof to any person or circumstance is declared to be invalid, such invalidity shall not affect other provisions or applications of the ordinance which can be given effect without the invalid provision or application, and to this end the provisions of this ordinance are declared to be severable.

Section 3. This ordinance shall become effective on and after 12:01 A.M., October 1, 1974.

Adopted this 3rd day of June, 1974.

APPENDIX 8

RALEIGH RESOLUTION TO ESTABLISH A POLICY FOR THE EXTENSION OF CITY FACILITIES

RESOLUTION NO. (1974) -112

A RESOLUTION TO ESTABLISH A POLICY FOR THE EXTENSION OF CITY FACILITIES

WHEREAS, the City of Raleigh has recently suffered extensive flood damage; and

WHEREAS, the City of Raleigh, through its policy of extending City facilities, has the power to encourage development of various areas of Wake County in and around Raleigh; and

WHEREAS, the County of Wake is aware of the need to protect its county seat, Raleigh, from flood damage; and

WHEREAS, the County of Wake has recently assumed a more active role in providing flood protection devices for the benefit of citizens of Raleigh and the remainder of Wake County; and

WHEREAS, the County of Wake is in a position to expedite the development of flood control devices still further.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF RALEIGH, NORTH CAROLINA:

Section 1. The County of Wake is hereby commended for its efforts to provide flood protection for its citizens, in Raleigh and elsewhere.

Section 2. That the City of Raleigh joins the County of Wake in taking a position of not encouraging development of land which will, necessarily, result in greater liquid runoff, soil erosion and sedimentation until adequate devices have been installed to reduce those adverse effects of land development.

Section 3. That the City of Raleigh, to that end, hereby states a policy of not extending water and sewer service facilities -- or any other facilities under its control -- into areas of Wake County outside the City Limits, except in unusual circumstances, unless and until areas into which such services are extended and the area within the City Limits of the City of Raleigh are adequately protected, through the installation of related flood control and other such devices, and unless and until adequate facilities are available for the supply of water and the treatment of sewage.

Section 4. All resolutions, policies and other such actions of the Raleigh City Council in conflict herewith are hereby repealed to the extent of said conflict.

Section 5. That this resolution shall be effective immediately upon its adoption.

Adopted: 2/7/74

Effective: 2/7/74

APPENDIX 9

PROJECT FLOOD CONTROL PETITION

A PETITION FOR REDRESS OF GRIEVANCES IMPOSED UPON THE CITIZENS OF WAKE COUNTY.

Many homeowners and many small business establishments have suffered crushing damage from the flooding of Crabtree Creek and other streams in this county. This has been due, in large measure, to the pell-mell, haphazard land development which has been permitted in this county.

We, the undersigned, do now call upon each and every member of the Wake County Board of Commissioners and we do now call upon each and every member of the Raleigh City Council to heed the injuries visited upon the persons and the property of countless citizens; and we do petition these elected public officials to do the following:

(1) *Take appropriate action to condition the issuance and continuing validity of any building permit for any structure in the county upon a showing that the structure will not contribute to the flooding of other property and a showing that the builder is adequately providing for surface water runoff and protecting against soil erosion, to the end that the property of others is not damaged!*

(2) *Enact effective ordinances for floodplain control to the end that citizens throughout the county will qualify for flood damage insurance under Federal programs.*

(3) *Take effective action to assure that no public works construction, whether buildings or sewer lines or streets or highways, will contribute to flooding or damage to other property.*

(4) *Get underway promptly effective action to complete adequate flood control dams in the Crabtree Creek basin.*

(5) *Stop projects for extending sewer lines west of Raleigh which will permit further land development until effective flood control measures in the Crabtree Creek basin has been completed.*

(6) *Get underway promptly effective action to clear the Crabtree and other waterways of debris and obstructions and provide for appropriate dredging, consistent with other environmental impact concerns, of those shallow portions of the waterway channels.*

(7) *Institute a system of early warning of possible flooding to reach ALL citizens in the flood susceptible areas.*

(8) *Provide for emergency post-flood public services for flood victims, trash and damaged property removal, street and road washing to clean away silt and mud, and appropriate health protection measures to guard against insect breeding.*

Signature	Address

d To: PROJECT FLOOD CONTROL, P. O. BOX F26374, RALEIGH, N. C. 27611 or 2719 ROTHGEB DRIVE, Raleigh, N. C. 27609

APPENDIX 10

REQUEST FOR ARCHEOLOGICAL STUDY

STATE OF NORTH CAROLINA
Department of Cultural Resources
Raleigh 27611

James E. Holshouser, Jr.
Governor

Grace J. Rohrer
Secretary

Division of Archives and History
H. G. Jones, Director

16 January 1974

Ms. Jenny Munro, Project Assistant
United States Environmental Protection Agency
Region IV
1421 Peachtree Street, N.E.
Atlanta, Georgia 30309

Dear Ms. Munro:

Thank you for the opportunity to comment on historical and cultural resources near the proposed Crabtree Creek Interceptor Sewer, Wake County. We have consulted the National Register of Historic Places and can report that no National Register properties or properties under consideration for nomination lie in the project area.

It should be noted, however, that Crabtree Creek is itself a natural feature of considerable historical significance as one of Wake County's earliest landmarks and focuses for settlement. The Mouzon map (London, 1775) shows the existence of Crabtree Creek--so named when the area was still part of Johnston County. The historical importance of the creek requires that two steps be taken: the investigation of potential archaeological sites and the protection of its natural condition.

Since the creek and its tributaries provided a favorable living area for aboriginal settlement, it is likely that a number of aboriginal archaeological sites exist within the project area. In addition, at least two early mill sites are known to exist, and there may be more. Little or no archaeological survey work has been done; we would like the opportunity to perform such a survey. For further information, please contact Dr. Stephen J. Gluckman, Chief, Archaeology Section, of this Division.

Despite rapid development which has altered the natural growth along some sections of the creek, much of the creek remains in its natural condition and is recognized by environmentalists as being an important ecological and recreational resource. Given the significance of the creek to the history of Wake County, any further development along its banks should be done in a manner to protect the natural growth along its banks.

Thus we would urge that any sewer installation follow the guidelines for erosion and sediment control in the publication EPA-R-2-72-015. As you know, it has been suggested that the sewer line installation, if done according to these guidelines, could become part of the proposed greenway system. Such a project would enhance the historical and cultural significance of the creek to Wake County.

Please let us know if we can provide any additional information or assistance.

Sincerely yours,

HGJones

H. G. Jones

APPENDIX 11

PUBLIC HEARING

OFFICIAL REPORT OF PROCEEDINGS

BEFORE THE

ENVIRONMENTAL PROTECTION AGENCY

IN THE MATTER OF

The Draft Environmental Impact Statement
On The Crabtree Creek Sewer Intersect

Place: State Highway Commission Building, Wilmington,
Street, Raleigh, North Carolina

Date: March 13, 1975

Pages:	100
Name:	Thyra D. Ellis & Associates
Address:	500 Ninth Avenue, North Jacksonville Beach, Florida
Reporter:	Susan Gay Hess

UNVERIFIED LISTING

Tree Academy 77

SPEAKERS

Name	Representing	Page
Dr. Millard B. Bethel	Wake County Health Department	10
Mr. H. A. Smith	Department of Natural Resources, Wake County	12
Mr. Johnnie H. Robertson	Mayor, Town of Morrisville	19
Mr. James O. Waller	U. S. Army Corps of Engineers	21
Mr. Robert E. Giles	Northwest Community Task Force	25 86
Mr. George R. Goodwin, Sr.	Wake County Commissioner	35
Mr. Dodge Geoghegen	Raleigh Chamber of Commerce	39
Mr. George S. Willoughby, Jr.	PROD	42
Mr. Victor V. Langston	Project Flood Control	46
Miss Anne Taylor	Sierra Club	52
Mr. R. A. Dunaway	Citizen	58
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Mr. L. P. Zachary	Raleigh City Council	69
Mrs. Joyce Anderson	Wake Environment, Inc.	72
Mr. F. S. Worthy, Jr.	Citizen	77
Mr. Fred Bond	Mayor, Town of Cary	80
Mr Charles M. Elam	Cary, North Carolina	81

- - -

(The hearing was called to order at 7:30 o'clock p.m., March 13, 1975.)

MR. ORIN BRIGGS: Okay. Let's call the meeting to order. I am Orin Briggs, regional counsel for the Environmental Protection Agency in Atlanta, and on behalf of the EPA, I would like to welcome all of you to the hearing tonight on the Draft Environmental Impact Statement on the Crabtree Creek Sewer Intersect, which is almost flooded out there as we drove by today.

I would like to first introduce the other members of the panel. On my immediate left is Mr. William W. Puette, who is assistant director of the North Carolina Department of Natural and Economic Resources, and with Mr. Puette, we have Mr. W. E. Knight, director of Water and Air Quality Control next to him.

Then, on the far left, my far left, we have Mr. L. P. Benton, Jr., who is chief, Field Service Unit, in the same department. And, then, the other two members of the staff of Region IV in Atlanta on my immediate right is Mr. Joe Franzmathes, who is the director of the Water Program Division, and then on the far right, is Mr. David Hopkins, who is chief of our Environmental Impact Statement Branch and who has the responsibility of preparing the Draft Impact Statement and reviewing the comments that will be made tonight.

Before we begin hearing statements from those who wish to make statements, I would like to ask a member of our staff, Mr. Bob Howard, to come and give us a brief statement about the statements and comments that are in the Environmental Impact Statement and give us a brief summary of the project at this time.

MR. ROBERT B. HOWARD: Thank you, Orin. I want to thank all of you for coming here tonight, and I have seen many familiar faces here and my name, for those who don't know me, is Bob Howard, and I am the project officer with the Crabtree Creek Environmental Impact Statement, and this statement has been prepared in accordance with the National Environmental Policy Act of 1969, and the Council on Environmental Quality Guidelines and EPA Guidelines.

These regulations direct the responsible Federal agency -- in this case, EPA -- to prepare a report when a major action will have a significant impact on the quality of the human environment.

This statement addresses the environmental impact of granting funds for the construction of an interceptor sewer to service the upper Crabtree Creek basin west of Raleigh.

It may be seen from this map, which you can't see. The project is going to tie in with the existing

Crabtree Creek interceptor in the Oak Park subdivision, and it will go up Crabtree Creek, around Umstead State Park, up Richland Creek, out Crabtree Creek to Cary's Coles Branch Treatment Plant.

The waste water generated in the project service area will be transported to the New Neuse River Waste Water Treatment Plant, and this plant is designed to provide better than secondary treatment and discharge to the Neuse River, meeting fish and wildlife water quality standards.

The major benefits to be gained from the proposed project include the elimination of nine waste water treatment plants now discharging to Crabtree Creek or its tributaries.

Further, the project has the potential to facilitate good land use planning in the project area since area-wide waste water collection will remove sewage treatment and disposal as a primary developmental constraint and allow other considerations such as slope, transportation, soils and water supply to have a greater bearing on the location and type of development in the upper Crabtree basin.

The proposed project will greatly affect the growth and development of the project area, also. Development could be expected to occur considerably faster with the project than might otherwise be expected.

Further, densities in the service area would also be expected to be higher with the interceptor than without. The major adverse impacts of construction and operation of the project are: Potential erosion and sedimentation impacts from construction, potential archaeological, historical and cultural impacts from construction, and certain aesthetic losses.

The major secondary impact from the induced growth of the proposed project would be increased flood stages in Crabtree Creek from development, potential contributions of pollutants from urban runoff, and an increased demand for community services and resources.

Various measures have been included in the project to avoid or mitigate the primary adverse impacts. The most significant of these include the preparation of an erosion control plan, a survey of the vegetative communities, and the investigation of archaeological sites along the interceptor route.

The secondary adverse impact of increased flooding is one of considerable concern to all of us, especially the people in the downstream community from this proposed project, and the EPA proposes to delay release of grant funds for the project until steps are taken to assure the project will not aggravate flooding problems.

The proposed Soil Conservation Service's dams present the best solution known today. Accordingly, the Draft EIS recommends required land for the dam sites be acquired by January 1, 1976.

There is considerable additional information given in the Draft EIS, and if you haven't had the opportunity to review the EIS, you may do so at the local libraries.

Also, the record of the public hearing will remain open for 15 working days following this hearing for the submittal of written comments, and these comments should be sent to Mr. David R. Hopkins, Chief, EIS Branch, EPA, Region IV, 1421 Peachtree Street, Northeast, Atlanta, Georgia, 30309.

Mrs. Reid, at the door, can give you this address if you need it later. Thank you.

MR. BRIGGS: Thank you, Bob. The notice of this public hearing was published on February the 20th, and March the 10th, in the Raleigh News and Observer, and we will attach a copy of this notice as part of the record of this hearing.

This public hearing is held pursuant to regulations of the Environmental -- on the Council Environmental Quality and on EPA's regulations with regard to preparations of Impact Statements, and the purpose of it is to encourage the full participation of the public in the

EPA decision-making process, and it is intended to develop greater responsiveness of governmental action to the public's concerns and priorities and to develop improved public understanding of federally-funded projects.

Earlier this evening, I took the opportunity to walk through the grounds of your old capitol over there, and I think I found an appropriate quote from one of your early statesmen, and I am going to read it at this time.

It was on the statue of Mr. Zebulon B. Vance, and he had this to say, and it is engraved on the granite stone over there below his statue: "The subjection of every passion and prejudice to the coolest way of judgment and reason when the common welfare is concerned is the first victory to be won."

I am sure Mr. Vance would be proud of us tonight since we are letting reason prevail and we are giving the public the opportunity to express their opinion, and I hope those who wish to will tonight.

We will hear from the speakers in the order that you have registered, and if there are some here who wish to speak and have not registered, I would again urge you to go back and register out in the hall with Mrs. Reid.

We would like to ask you, if you would, to limit your comments to between ten and fifteen minutes on the first go-round, and then if you have more to say when we have heard from everyone, we will be glad to give you additional time.

In addition to this, you are welcome to submit any lengthy statement in written form, and, of course, you are welcome to submit any written statements after the hearing until April the 1st, when the hearing record will be closed.

In addition to this, we would like to remind you that there will be no questions from the audience addressed either to the panel or to a speaker. However, if there is a point that needs clarifying or there is some data that we are in question about, I will ask one of the members of the panel to address a question to the speaker for the purpose of clarification.

Of course, there will be no formal rules of evidence. We won't ask the witnesses to state an oath, and as I indicated, we will not have direct questions to the speakers or to the panel.

However, if there arises a point where a member of the audience would like to rebut something made -- some statement made by a speaker, we would ask you to follow procedure, to register again, and you can come back up and make your rebuttal remarks as you choose to.

And, before we call those who are going to speak, I would suggest this, that when you are called upon, we request you to give a copy of your statement, if you have one, to me and to the court reporter down below, and then state your name and any organization which you represent, and then begin your statement.

And, with those comments, we would like to begin the statements tonight with Dr. Bethel, director of the Wake County Health Department.

DR. MILLARD B. BETHEL: Thank you, Mr. Chairman. I am Dr. Millard B. Bethel, director of the Wake County Health Department, Raleigh, North Carolina.

The thought of permitting any kind of growth or development within the upper Crabtree catchment basin without sanitizing the resultant human wastes is so revolting as to preclude consideration.

The connection between disease transmission and poor or absent sanitation is so well established that it is no longer debated in modern societies. That further building within the area under discussion shall be forever prohibited is likewise too farfetched to contemplate. It will not happen.

There will be growth. There will be odious wastes, both domestic and industrial. The health of this community of people will be increasingly at risk if these wastes are not properly handled. The privy of yesteryear we contemplate only in jest.

The grotesque septic tank, for all its widespread use, is but little better. It is inefficient, expensive and requires constant monitoring. The soils in the western reaches of Wake County are singularly unsuited to septic tank installations; there is almost no way to foretell success or failure in any particular case.

The next step up the ladder is the so-called package treatment plant. Ideal installations under ideal supervision backed by ideal government monitoring will work, but these ideals are so rare as to be unreal. Something nearly always slips and the stream next below is victimized.

What we need in the upper Crabtree is a basic system of sewers. Most pressing, even overdue, are the Richland Creek and Coles Branch portions because four sister agencies have very compelling need for sewers.

These are North Carolina State University, the towns of Apex and Cary, and the state government. When it becomes necessary once a year, at state fair time, to haul away in tank trucks the sewage from the milling throngs, many are the heads that should be bowed in shame.

Now that we have a chance to do so much good in one mighty stroke, let us grasp the sword and have at it. Good for the public health? Of course it is; basic and necessary.

MR. BRIGGS: Thank you. Now we will hear from H. A. Smith, director of the Department of Natural Resources for Wake County.

MR. H. A. SMITH: Thank you, Mr. Chairman. I am H. A. Smith, director of the Wake County Department of Natural Resources. I want to thank you, Mr. Chairman, for the opportunity to comment on the Environmental Impact Statement relative to the awarding of grant funds for construction of an interceptor sewer line in Wake County.

Wake County, or the government of Wake County, is vitally concerned with all the many facets of the project -- the establishment of a regional waste water collection system, the control of flooding, the control of erosion and sedimentation, the wise use of all of our natural resources in this area, as well as meeting the demands for community services.

In essence, the county government is desirous of and is committed to maintaining and enhancing the "'livability' of the total community."

The awarding of the grant funds, according to the

Environmental Impact Statement, is conditioned upon acquisition of land rights for the proposed Crabtree Creek flood control dams within each of the proposed service areas, or some agreement on other measures to insure adequate flood control.

Wake County has already taken a number of specific and very significant steps indicative of the commitment of the county to wise land use management.

For example, voters of the county approved a $1 million bond referendum in 1968, to help pay the cost of the flood control project. The county established a Department of Natural Resources and it staffed it to deal with not only flood control, but with sediment control, conservation planning and all related natural resource matters.

As a matter of fact, Wake County was the first and the only county in the state to take such action. A county sediment control ordinance has been adopted and is now in the process of being fully implemented. A flood plain ordinance has also been adopted. In addition to that, a tentative schedule for completion of all five of the remaining flood control dams in the Crabtree basin has been formulated, and a target date for completion of that construction will be within about four years.

I would like to point out that progress on construction of dams in the Crabtree Creek project has been very significant, especially in recent years. The current status shows a rather dramatically improved condition over that that is reflected in the Environmental Impact Statement.

Dams Number 2, 3 and 18 are correctly reported as being complete as they have been for several years. In addition to that, Dam Number 13 -- and many of you have seen that on Shelley Road -- is now about 90 percent completed and it is in a position to retard flood waters should we have a flood tonight, as some people are predicting.

It should be totally completed within 60 to 90 days. All that remains is some finished grading and building of a fence. Dams Number 1 and 22 are under construction contracts and they are scheduled to be completed before January 1 of 1976.

These new dams will afford considerably more flood water storage capacity than the older dams, and I would like to cite some figures to you to verify that statement.

Dam Number 2, which was completed in June of 1972, has a capacity of 346 acre feet. That is its storage capacity. Dam Number 3 has a capacity of 561 acre feet, and Dam Number 18 has a capacity of 611. This gives you a total of 1,518 acre feet, and the three dams have been in place for two to three years.

Number 13 that we mentioned, that is now 90 percent complete in a condition to hold flood waters, will, within itself, have a capacity of 2,195 acre feet, more than the other three combined.

Number 22-B, which will be completed this year, has a capacity -- has a planned capacity of 919 acre feet, and Number 1 has a capacity of 480 acre feet, so the three that will be completed during this year will have a combined capacity of 3,594 acre feet.

Dam Number 11 is projected for completion during calendar year 1976, and it will have a capacity of 1,122 acre feet. At that time, at the end of 1976, the total capacity for those seven dams will be 6,234 feet.

In essence, I am saying that the completion of the three dams in this calendar year, 1975, will more than triple the capacity to retard flood water in the Crabtree Creek basin as compared to previous conditions.

Completion of Dam Number 11 next year will quadruple the capacity. These measurements we feel will go far toward mitigating the probability of damages from flooding in downstream areas, and in our opinion, they should be given very heavy consideration, Mr. Chairman, as an indication of what Wake County has done and is doing to alleviate flood damages in the Crabtree Creek basin.

On Page 138 of the EIS, a statement is made, and I quote: "Should the rights to the property for Structure 11 and Structure 25 be acquired, construction of this segment shall proceed to provide services to the state facilities presently at capacity."

Wake County concurs in and readily accepts the requirement -- or the prerequisite, if you will -- to acquire land rights for dam site Number 11 as an appropriate, reasonable and feasible prerequisite to be accomplished before January 1, 1976.

As a matter of fact, efforts are already underway to accomplish this within the year, and I might add that that purpose is intended to be accomplished with or without the awarding of the sewer grants.

This is an ongoing part of the flood control project. Acquisition of land rights for dam site Number 25 before January 1, 1976, is not considered to be so practical or as feasible, and we would like to cite four reasons for that.

The first reason: Of the five remaining structures to be built in the Crabtree Creek project, Dam Number 25 is scheduled to be the very last dam to be built. For engineering and hydrologic reasons, the Soil

Conservation Service will not proceed with construction of Number 25 until the other upstream dams, namely, 5-A, 20-A and 23, are constructed.

While actual land acquisition for Number 25 is theoretically possible during 1975, the acquisition of these land rights alone will contribute nothing toward the problem of alleviating flood damages in the foreseeable future since the dam cannot be built immediately, as we have indicated earlier.

The third point, to accomplish acquisition for the land rights for Number 25 during 1975, would require that both Wake County and the Soil Conservation Service divert some of their financial and some of their personnel resources from their planned and scheduled uses on other dam sites.

Such diversion of resources would actually delay the rapidity with which flood retarding structures could and actually would be built.

The fourth point we would like to raise is that dam site Number 25 is near the boundaries of Umstead State Park. No development is anticipated within the park which would contribute to increased flooding.

Extension of the sewer line along Richland Creek could conceivably result in some activities in dam site Number 25 and dam site Number 11, which could add to downstream flooding. However, we are more than confident that these increases, should they occur, would be more than mitigated by the completion of Dams Number 13, 22 and 1 in 1975, and the completion of Number 11 in 1976.

As a result of these considerations, Wake County very respectfully and very sincerely recommends to you, Mr. Chairman, that the requirement to obtain land rights for Structure Number 25 be stricken from the Draft Environmental Impact Statement as a prerequisite for awarding of the grant funds for construction of the interceptor sewer lines.

Should, for some reason, this recommendation not be totally acceptable to you, Wake County would offer an alternate recommendation that a requirement to acquire land rights for either Structure Number 5-A or Structure Number 20-A, two of the upstream dams, be substituted in lieu of the requirement to acquire land rights for Structure Number 25.

At either of these alternate sites, the dam could be built very shortly after land rights have been acquired, thereby contributing to retardation of flood waters really at a much earlier date than would be the case if we were to acquire land for Number 25.

In summary, I make these four points: Wake County needs the grant funds for the interceptor sewer line; Wake County has made significant progress in several areas to alleviate flooding in the Crabtree Creek basin and is committed to the completion of the flood control project; Wake County accepts the prerequisite for acquiring land rights for Structure Number 11-A before January 1, 1976; the requirement to acquire land rights for Structure Number 25 can be totally stricken from the Environmental Impact Statement without changing the principal thrust of the statement to closely correlate provisions for flood control with any potential development.

Thank you for the opportunity of presenting this statement.

MR. BRIGGS: Thank you, Mr. Smith. We will now hear from Mayor Johnnie Robertson, the Town of Morrisville.

MAYOR JOHNNIE H. ROBERTSON (Morrisville): Mr. Chairman, on behalf of the citizens of Morrisville, I want to thank the Environmental Protection Agency for providing us with this opportunity to express our interest in the proposed waste water outfall along Crabtree Creek.

As you are aware, Morrisville is a small town located on Highway 54 near the headwaters of Crabtree

Creek. We have a population of about 200, and we are growing. As a result of this growth, we are facing the usual problems of providing our people with the municipal services they need and deserve.

Foremost among these needs are a water distribution system and a sanitary sewer or waste water collection system. Morrisville lies within the Triassic basin, and we have the usual problems with our water wells. If we are lucky enough to get a few gallons per minute from a well, the water is highly mineralized.

We rely entirely on septic tanks for sewage disposal, and the percolation rate in the soil is so low that our drain fields require an unusually large amount of space.

We have had engineering studies made and have applied for FHA and North Carolina state grants to construct a water system. The agencies tell us they cannot approve our request for grants for reasons all related to the lact of the proposed Crabtree Creek outfall.

We are aware of the anxieties of some of our neighbors downstream. However, the benefits to be gained from the proposal outfall clearly outweigh the disadvantages. Crabtree Creek is not receiving the effluent from the Mobile City waste treatment plant and from the

Town of Cary's Cole Branch Treatment Plant. During low flow periods, this is not very pleasant, but this problem can be eliminated by the outfall line. The erosion and the sediment control ordinances already adopted by Cary, Raleigh, and Wake County will control the adverse effects of land development in the watershed. The route of the outfall line can be incorporated by a greenway system.

Many people will benefit from the existence of the proposed Crabtree Creek waste water outfall line, and we want the records to show that the Town of Morrisville is in favor of the line being built as soon as possible, and I want to thank the people from the Town of Morrisville for being here tonight at this meeting.

Thank you, Sir.

MR. BRIGGS: Thank you, Mayor. The next person will be Mr. James O. Waller, Corps of Engineers, Wilmington District.

MR. JAMES O. WALLER: I am James O. Waller, the Crabtree Creek study coordinator of the Corps of Engineers in Wilmington, North Carolina.

The Corps of Engineers, Wilmington District, concurs with the conclusion of the Draft Environmental Impact Statement that completion of the Soil Conservation Service's upstream flood retardation structures is necessary to reduce the serious flood problem along Crabtree Creek in Raleigh. Additional runoff from future development of the watershed should also be controlled so as not to further increase flood stages and endanger property and lives in downstream areas.

Immediate action to facilitate completion of the SCS structures is imperative. Only then can any downstream non-structural or structural flood control measures be fully effective.

As most of you know, the Corps of Engineers is currently studying alternative ways of solving the flood problems that will remain along Crabtree Creek after the upstream Soil Conservation Service structures are completed. We began our Crabtree Creek study in 1972, at the request of the State and the Soil Conservation Service, and we expect to complete our study and make recommendations sometime next year.

Most likely, some of you suffered heavy losses from the two major floods in 1973. The February flood was approximately a ten-year flood, and the June flood was approximately a 20-year flood, and these two floods caused a total of $13.3 million in property damage and Raleigh can expect to receive an average of $3.7 million in flood damages annually along Crabtree Creek until the Soil Conservation Service structures are complete.

Completion of these upstream structures will lower the average annual damage total to $1.4 million, or by approximately two-thirds. However, an assumed 80 percent development of the watershed after the structures are built would increase the remaining annual damages from $1.4 million to $1.9 million.

Our study is looking at the alternative ways of reducing the remaining $1.9 million in average annual damages. Of the remaining damages, 95 percent of it is to commercial and residential properties in the Wake Forest Road and Farmers Market areas. I might add that our study results will not be valid if all the SCS structures as presently designed are not built.

In our study, we are evaluating the possible flood control and recreation alternatives. The flood control alternatives include non-structural measures such as flood proofing the flood-prone building and structural measures such as channel improvement to protect major damage areas.

Implementation of the greenway system of trails and recreation areas along Crabtree Creek as part of any project is also being evaluating. In all cases, we will seek to preserve and protect the natural environment as much as possible, and we will not destroy Lassiter's Mill Dam.

Throughout the study, as an integral part of the planning process, we have tried, to the limit of our available resources, to involve the public in what we are doing to help the citizens of Raleigh. We formed the Crabtree Creek Citizens Assistance Committee and asked several civic, neighborhood, environmental and business organizations to work with us.

Three meetings were held to identify and discuss the problems and needs along the creek. It has been almost two years since our last meeting with the citizens' group due to planning progress which has been hampered by limited resources and funding.

However, this delay has not reduced our desire to have an open planning process and to include the public and their interests and viewpoint. We plan to have the next Citizens' Committee meeting as soon as we complete our evaluation of the alternative measures.

Before the end of 1975, we will present our alternative plans, which will include the various flood control and recreation measures combined into comprehensive plans that must be economically justified, environmentally sound and socially acceptable.

A plan to be recommended to Congress will be selected from the alternative plans in 1976. Construction of the project to reduce the remaining flood damages would then depend on authorization and funding by Congress and strong local support.

Thank you for the opportunity to make these comments.

MR. BRIGGS: Thank you, Mr. Waller. We will next hear from Mr. Robert E. Giles, chairman, Northwest Community Task Force.

MR. ROBERT E. GILES: Thank you, Mr. Chairman. Mr. Chairman, I have a rather lengthy and to me completely interesting statement which is going to take more than 15 minutes, so I am going to limit myself to that period of time and request if it is possible to have maybe four or five minutes following everybody else for some concluding remarks because I don't think I will get to that portion.

MR. BRIGGS: Let me comment that you may have that additional time, but if you would rather not do it, we can print the statement as though it were read in its entirety. But, you may read the whole statement and make any comments that you wish.

MR. GILES: Mr. Chairman, as you noted, I am here as chairman of this Northwest Community Task Force group. This is one of some 18 task force groups in the Raleigh area. It is a fairly large area and includes several subdivisions.

Through this area runs Crabtree Creek and some of its tributaries, and this area experienced some serious flooding on the two occasions in '73, although not as extensive and damaging as occurred in areas further downstream.

At least on one occasion in January of '75, the Crabtree Creek channel in the Raleigh area filled to the top and it overflowed in some places. We came pretty close to having another serious flood in 1975. So, what happens in the upper Crabtree Creek area which adds to the flood conditions of the basin downstream is of direct consequence to those of us in the Northwest sector.

You might say that the residents there, as well as the residents of the other areas, are parties at interest. We commend the authors of this report -- that direct the Draft Impact Statement -- for its comprehensive scope. It certainly reflects a great deal of study and careful analysis.

The discussion regarding the consequences of heavy development in the upper Crabtree basin, and the compelling need for sound, comprehensive land use planning and action on the part of local government, that discussion is outstanding. At Page 153 of the statement -- Impact Statement -- is this comment and conclusion, and I quote: "Development of the upper watershed must not be allowed at the expense of further endangering property and lives in downstream areas."

Now, we are in absolute complete agreement with that conclusion and we cannot imagine that any citizen in Wake County, whatever his private interests may be, could support any different conclusion. We cannot imagine that any public official or any local governing body in Wake County could fail to support, in word and in deed, the simple, clear-cut proposition: Development of the upper watershed must not be allowed at the expense of further endangering the property and lives in downstream areas.

We approve and endorse the general thrust of the draft Impact Statement. However, we are concerned as to whether the wording on the release of the federal funds is sufficient to assure that this sewer line project will not be a direct contributing factor to "further endangering property and lives in downstream areas," a consequence which none of us wants to occur.

Our questions and recommendations on the Impact Statement are offered for the purpose of being constructive, and we hope that is what they will be. Mr. Chairman, we have some questions -- perhaps because we don't understand the discussion in the Impact Statement -- regarding the frequency of rainfall and the floodings that have occurred.

At Page 53, it is noted that the 1957 flood was one --

was from a storm of a 6.7-year frequency. With regard to the February 2nd and June 29, '73, floods, there is this comment on Page 22: "These flows were the highest on record and constituted an estimated 20-year flood (a flood which has a probability of occurring once every 20 years.)"

Now, there is no indication in the Impact Statement as to how and by whom these estimates of storm and flood frequency were made. We suggest that any such estimates relied upon in the final Impact Statement should be spelled out in an appendix and expressed in terms that will be readily understood by the public.

And, in particular, any assumptions about the amount and frequency of rainfall should be stated. There is some fairly specific information on frequency and the amount of rainfall which has occurred in Wake County. Recently, I requested this information from the National Weather Service, the Raleigh-Durham Airport station.

I received the recorded information on the rainfall which fell in connection with the May '57 flood, the February 2nd '73, and June 29 '73, floods. Mr. Thomas Zickus, hydrologist at the Weather Service office, responded to my request.

I have submitted a copy of his letter along with my statement for the record. He refers to the Rainfall

Frequency Atlas of the Weather Bureau. That is identified as Technical Paper Number 40. It shows the amount and frequencies of recurrence for all sections of the United States, including Wake County.

Let me give you just a brief rundown. In terms of frequency of rainfall, what is a one-year rainfall in Wake County? The Weather Bureau Atlas says, on the basis of their records, that is three inches. A two-year rainfall, 3.6 inches; a five-year rainfall, 4.75 inches; a ten-year, 5.7; twenty-five years, 6.5; fifty years, 7.25, and a one hundred-year rain storm is 8 inches.

The amount of rainfall that fell in connection with the three floods, what was it? 4.33 inches in May, 1957. During the 24-hour period of February 2nd, '73, the Weather Bureau records show that at the airport 3.22 inches.

Four inches in the Leesville area, 4.6 inches north of Raleigh, 4.5 inches within Raleigh. For the Crabtree Creek basin overall, something like four to four and a half inches.

During the 24-hour period of June 29, 3.4 inches measured at the airport. 4.4 inches in Leesville. At points north of Raleigh, 3.5. In Raleigh itself, 3.7 inches, with a very heavy rainfall, Mayor, that happened out at Morrisville, 5.5 inches.

So, it is obviously spotted. But, for the Crabtree Creek basin area overall, apparently, according to the Weather Bureau records, something in the neighborhood of four inches. June 29, 1973.

Now, our only question is how do these statistics relate to a conclusion that those were 20-year floods in '73? It seems to me that we have these conclusions, that the rains in connection with them were rains on the approximate five-year frequency.

Incidentally, the Raleigh area has experienced three major floods during the 16-year period, '57-'73, three divided into 16 gives something. Anyway, there appears to be a rather close correlation between what we have actually had and what the Weather Service Rainfall Frequency Atlas indicates.

Our next question? What kind and what extent of flood protection from these 11 Soil Conservation Service flood control dams? In March of 1964, the Crabtree Creek Watershed Work Plan was released. It was explained and expressed as a plan which would provide 100-year storm frequency protection for the urban and industrial-zoned floodplain in and adjacent to the City of Raleigh by utilizing structural works of improvement, supported by land treatment.

Since '64, four structures have been deleted and the proposed channel improvement program is still under study, and that has been turned over to the Corps of Engineers. The Draft Impact Statement says, Page 58: "Should the SCS project be completed, flood protection from the 100-year storm will be provided for the City of Raleigh."

In other words, apparently completion of the 11 flood control dams which now remain in the project will give Raleigh 100-year flood protection. Perhaps I am misreading. Perhaps the point should be clarified.

Certainly, we would all agree that this is a very important point for the clarification of the people in this county. Exactly what can we expect if this project, as it is now on the table or on the board, if it is completed? Specifically, we would like to urge EPA to submit the following questions to SCS, as well as to the Corps of Engineers:

One: Will completion of the 11 flood control structures now in the Wake County Watershed Improvement Plan provide the Raleigh area with protection from 100-year frequency rain storms?

Two: In the light of development in the Crabtree Creek basin since 1964, and assuming 80 percent development in the upper Crabtree basin as a result of installing the sewer interceptor line, does SCS or the Corps recommend any change in the system of 11 dams in order to provide water retention capacity above that which will be possible?

It would be quite disillusioning if we went ahead with this project in proper timing with the completion of the dams and then we learned when it was too late that the measure of protection from flooding, which we all expected, simply was not there, and in fact, could never have been there.

Question three: What conditions should be met before the sewer line project is funded? On Page 137, the restrictions, or qualifications, are set out. The grant fund shall be withheld until land rights have been acquired for the 11 structures, or until other measures are taken, including but not limited to channelization, urban run-off controls, development restrictions and so on.

"Grant funds shall be withdrawn January 1, 1976, et cetera." Undoubtedly, it is intended by these restrictions on the release of federal funds that the planned flood control dams will be completed by the time the sewer line is installed and before any significant development takes place upstream. However, we question whether the particular wording on the release of the funds is adequate to accomplish that result.

First, what is meant by other measures? We do not know. There are some examples, but is it conceivable that other measures, whatever they might be, could possibly provide flood control protection equal to that of these flood control dams?

Perhaps there are, but I am not aware of them. There is another questionable feature in that wording. Even if all the land rights for all the dams are obtained as of January 1, 1976, there is no guarantee that the flood control dams can be completed by the time the sewer line is installed and development take place thereby contributing to flooding.

For one thing, construction of these dams must be funded by appropriations from Congress. We cannot count on that funding until the appropriations have, in fact, been enacted into law by the Congress.

Now, how, then, should the qualifications on the release of these funds be worded in order to give reasonable assurance of adequate flood protection by the time the sewer line is installed and development begins to take place? We suggest the following, and I quote:

"Grant funds shall be withheld from the proposed project until: One, land rights have been acquired for all the Soil Conservation Service flood control structures; and, two, project agreements on all structures are signed by the county and SCS."

Now, incidentally, SCS does not sign project agreements until they have got the appropriated funds to build the dam, and that is the reason for that one.

"Three, the Soil Conservation Service and the Corps of Engineers each certifies to EPA that in their opinion the flood control structures together with such land use, water run-off and development regulations as are then in effect will provide protection from flooding (caused by 100-year frequency rainfall) for the urban and commercial areas within and adjacent to the City of Raleigh in the Crabtree Creek basin."

This suggested wording is no more -- and would provide no more than the objective of the 1964 SCS Watershed Plan, namely, 100-year flood protection. That is the objective which every involved local governmental unit has enforced. That is the objective citizens of Wake County endorsed in 1965, when they voted to set up the Watershed Agency.

It is the objective when the voters in Wake County endorsed in 1968 the bond issue, and no governmental agency -- federal, state or local -- has ever indicated, to my knowledge, that this objective of 100-year flood protection in the Crabtree Creek basin should be abandoned.

If this line is put in without requiring that, that will be an abandonment of that central, fundamental objective. I would like to emphasize in our recommendation that there should be no cut-off date. We strongly urge deletion of that January 1st, '76 deadline, and I would have a few more comments later, if it is permissible, Mr. Chairman, in concluding my remarks. Thank you very much.

MR. BIGGS: We will give you as much as you need to finish your statement. I would like to call now Mr. George Goodwin, Wake County commissioner.

MR. GEORGE R. GOODWIN, SR.: Mr. Chairman and ladies and gentlemen, we certainly appreciate this opportunity on behalf of the Wake County Board of Commissioners to appear before you and your panel, and I have with us tonight, besides myself, two of our commissioners, Mr. J. T. Knott and Mr. Robert Heater, who are commissioners.

We also have with us Mr. James Mills, our county coordinator, and Mr. John Scott, director of our Planning Department, and Mr. Smedes York, chairman of our Planning Department.

The Wake County Board of Commissioners is very grateful for the opportunity to talk with you this evening about a project that means a great deal to the county and the City of Raleigh. The Board of Commissioners of Wake County recognizes its responsibility to assist the City of Raleigh and all the other municipalities in our great county to provide for an adequate source of clean, pure water to meet the present and future needs of our citizens and to provide for the proper collection and disposal of the waste water generated thereof, to the end that a healthy, orderly and coordinated life-style might be maintained in a manner most conducive to the public health and general welfare of our county, as well as other municipalities.

Some four years ago, after a number of discussions between the county and the municipal governments in Wake County, the Wake County Board of Commissioners adopted a county-wide water and waste water plan, whereby, in cooperation with the municipalities, water and waste water services could be extended to a greater number of people through a regional or an area-wide system.

The Crabtree Creek sewer interceptor line that we are discussing tonight is a very important part of the plan for waste water collection in a very large area of our county.

As you might know, the Raleigh-Durham Airport, the North Carolina State Fairgrounds, North Carolina State

University, Carter Stadium, the National Guard Armory, Umstead State Park, the State Correctional Center, several agricultural experimental farms belonging to the State of North Carolina and University, the Town of Morrisville, portions of the Town of Cary, as well as industrial, school and residential areas presently are located in the upper Crabtree basin, and this sewer interceptor line will vastly improve the waste water pollution problem for the entire area.

As Wake County has attempted to find a solution to this rather complicated problem, it was realized in 1971, that to achieve the most desirable results, the financial assistance of the Environmental Protection Agency and the State of North Carolina would be needed.

Requests for funds were made to EPA on June 30, 1971, and to the State of North Carolina in 1972. The Environmental Protection Agency responded positively, and on December 29, 1972, made a grant offer of $2,445,750. It is our understanding that the State of North Carolina will consider financial assistance on this project as soon as Wake County meets all the requirements of EPA.

The financial assistance of both these agencies is desperately needed, and as we see the situation, we are dealing with a twofold problem: First, the waste water pollution problem of the upper Crabtree basin, and, second, the existing and future problems of the lower Crabtree basin.

As of the end of the calendar year of 1975, six of the proposed 11 flood-control dams will have been completed, and the county has intensified its efforts to complete the remaining structures within four years. Wake County government is tremendously concerned that the flood problem of the lower Crabtree Creek basin be solved, and has placed this program in high priority.

We would close our remarks this evening by requesting that the Environmental Protection Agency and the State of North Carolina to consider the following actions: One. Approve the grant funds for the construction of the Crabtree Creek sewer interceptor line with the following provisions:

A. That the sewer line be constructed in each subdrainage basin or service area only after land has been acquired for the flood-control dams in that area, and that grant funds be segmented to accommodate this schedule.

B. Remove the requirement of acquiring land for Structure Number 25 before the Richland Creek segment of the interceptor sewer line is constructed.

Section two: Extend the time period for acquiring the land for flood control structures Number 5-A, 20-A, 23 and 25, because our technical people tell us that it is not feasible to accomplish this by January 1, 1976.

Wake County and all of the people, which comprise all of the people of this great community -- which you gentlemen have had the opportunity to see; I have heard you make some comments about the area this evening -- seeks your help in achieving the best solution to this problem.

And, in closing, we, Mr. Chairman, thank you very kindly for allowing us this time to present this matter as we as commissioners and the members of our committees see this problem, and we thank you again for the opportunity.

MR. BRIGGS: We thank you, Commissioner. Now we will hear from Mr. Dodge Geoghegan, representing the Raleigh Chamber of Commerce as president-elect.

MR. G. DODGE GEOGHEGAN: Mr. Chairman and gentlemen of the panel, ladies and gentlemen, I am Dodge Geoghegan, vice-president of the Raleigh Chamber of Commerce.

Our organization is an association of some 2,200 business and professional people representing over 1,400 business concerns throughout the community. Our organization concerns itself with the economic well-being of the business and citizen interest of Wake County. The scope of our program, implemented through task force assignments comprised of our membership, broadly spans all of those activities relating directly to the quality of life in our community.

We are pleased with this opportunity tonight to comment on the Environmental Impact Statement relative to the awarding of grant funds for construction of interceptor sewer lines in Wake County.

During the last decade, the growth of Raleigh and Wake County has been dramatic. In fact, our growth rate has been higher than Charlotte, Durham, Greensboro, Winston-Salem, all of urban North Carolina and the state as a whole.

A recent study forecasts that population within the city will almost double again during the next 20 years. This growth has been and will be created primarily by the expansion of government, by the broadening of our trade area, by increased travel business within our community, new industry locating here, and the need for new services.

The Raleigh business community, in accepting its role for the responsible growth of Wake County, also accepts responsibility for supporting those governmental and private interests working towards providing community services necessary to maintain the quality of life for which we all strive, regardless of our endeavors or affiliations.

We feel that the discussion here tonight, pertaining as it does to one of the most important community services, deserves the serious and responsible consideration of all our citizens. We are pleased and indeed have strongly supported the efforts undertaken by our county officials in the vital areas of establishing a regional waste water collection system and the collateral issues of flood, erosion and sedimentation control.

We have been working closely through the years with Raleigh and Wake County officials in support of the flood control problem, and are committed presently in firm support of Wake County's efforts to achieve early completion of the remaining flood control structures.

Much significant progress has been accomplished and has been properly documented for this hearing tonight. It is documentation, in our opinion, which testifies to the good faith and concern of our county, city and public officials, for the problems which past and future growth has and will create.

It is our understanding that the awarding of federal grant funds for construction of an interceptor sewer line in Wake County is contingent on purchase of all remaining lands for flood control by January 1, 1976.

Our county, Mr. Chairman, needs the financial support of these federal funds, and our citizens need the proposed interceptor sewer lines. But, in consultation with county officials and civic leaders, we feel that the acquisition of the proposed land areas by the termination date is not realistic and, indeed, impossible to accomplish.

We would instead file this request most respectfully that you consult and work with our county officials to establish a more realistic timetable for the completion of flood control structures coinciding with the construction of the interceptor sewer lines.

It is my pleasure, on behalf of the Raleigh Chamber of Commerce, to thank you, Mr. Chairman, for the granting of these federal funds and the opportunity of appearing here tonight.

MR. BRIGGS: Thank you. Mr. George S. Willoughby, Jr., president and executive director of PROD.

MR. GEORGE S. WILLOUGHBY, JR.: Mr. Chairman, gentlemen, I am George Willoughby, president and executive director of an organization known as PROD, or Progress for Raleigh-Wake County through Orderly Development.

Our organization has been labeled as a lobbyist group for the development and real estate industry in Raleigh. While the term "lobbyist" is not inclusive of the many activities of this group, we will accept it if it means that we dare to speak out on issues that may not have public appeal.

First, let me say that we are not anti-environmentalist. Raleigh did not achieve its reputation as a desirable place to live in just the last two or three years. This reputation is a result of many years of planning and development by the industry which we attempt to represent.

However, we do not support flooding. As a matter of fact, I live in the Oak Park-Glen Forrest-Deblyn Park area myself, and I don't particularly like to live in it. Nor do we support the uncontrolled development of our natural resources.

However, we do support the construction of an interceptor sewer line in Wake County to service the upper drainage basin of Crabtree Creek. We are concerned with recent media reports which quote the draft EIS as stating that grant funds would be withdrawn unless all land rights have been acquired for the flood control structures by January 1, 1976.

The Wednesday, March 12, issue of The Raleigh Times states, and I quote: "EPA said in its draft statement that no federal funds will be granted for the line until the county acquires land rights for 11 dam sites. EPA placed a January, 1976, deadline on the acquisition."

The Draft Environmental Impact Statement states, and I quote: "Grant funds shall be withdrawn January 1, 1976, from the proposed project if land rights are not acquired for the SCS structures or agreement on other measures to insure adequate flood protection is not reached."

The statement is emphatic that other measures can be taken including, but not limited to, channelization, urban run off controls, developmental restrictions and other lane use modifications which will insure adequate flood control as determined by the State of North Carolina, the Soil Conservation Service, the Corps of Engineers and the Environmental Protection Agency.

Wake County has enacted the Wake County Erosion and Sedimentation Control Ordinance which has already restricted development in the upper Crabtree basin. Although development in western Wake County is not restricted, it will still take place even if the sewer interceptor is not constructed.

The land would be developed through the use of septic tanks (where soil conditions allow) and through package treatment plants. This type of haphazard development is not needed in western Wake County.

At the urging of PHOD, the Wake County Board of Commissioners has appointed a Real Estate Advisory Committee to assist in the acquisition of land rights for the SCS control structures. This committee is composed primarily of members of our organization.

It is sate to state that more progress has been made in the past 18 months in the area of dam construction and acquisition of land rights than had been made in the previous ten years.

For this reason, we do not feel that the Draft Environmental Impact Statement should contain the reference to the withdrawal of grant funds January 1, 1976, although we would agree that the acquisition of sites for the flood control structures should be accelerated within the limits of the funding available from Wake County.

The serviced area lends itself for a model community planned through the comprehensive programs of land use and community service. The area will serve not only the Raleigh community, but the Research Triangle as well.

Raleigh, state governmental agencies, Cary and Morrisville, need the sewer interceptor. The time has come to initiate an affirmative and not a negative approach to this construction project. Thank you.

MR. BRIGGS: Thank you, Mr. Willoughby. Next, Mr. Victor V. Langston, chairman, Project Flood Control.

MR. VICTOR V. LANGSTON: Thank you, Mr. Chairman. Ladies and gentlemen, I speak to you this evening as an aggrieved citizen, a flood victim. My residence at 2719 Rothgeb Drive was flooded twice in 1973, by Crabtree Creek.

On each occasion, every room in my house was covered by at least 12 inches of water. In the February flood, my automobile was covered with water up to the dashboard.

When I purchased this house in 1972, I took the time to check with the City Planning Department concerning its proximity to Crabtree Creek and the possibility of flooding. The information given to me was that there was no real danger of flooding in my particular location.

The owners of the home knew nothing of the possibilities of flooding since they had lived there only two years. I later learned that this property was partially flooded during 1956, but that there had been no flooding since that time.

I say this to point out that I did not knowingly locate in the flood plain and then ask for protection. I would maintain that the flood plain has increased to include my property as development has increased.

Secondly, I come to you as the chairman of Project Flood Control, a citizens' group formed after these floods in 1973. We sought effectively, I think, to place some curbs on pell-mell development and to insure that adequate steps were taken to improve flooding in the area. We presented petitions signed by several thousands of citizens to the City Council and the County Commissioners. The petition asked for the following actions, eight points:

To take appropriate action to condition the issuance and continuing validity of any building permit for any structure in the county upon a showing that the structure will not contribute to the flooding of other property and a showing that the builder is adequately providing for surface water run off and protecting against soil erosion to the end that the property of others is not damaged;

Enact effective ordinances for flood plain control to the end that citizens throughout the county will qualify for flood damage insurance under federal programs;

Take effective action to assure that no public works construction, whether buildings or sewer lines or streets or highways, will contribute to flooding or damage to other properties;

Get underway promptly effective action to complete adequate flood control dams in the Crabtree Creek basin;

Stop projects for extending sewer lines west of Raleigh which will permit further land development until effective flood control measures in the Crabtree Creek basin has been completed;

Get underway promptly effective action to clear the Crabtree and other waterways of debris and obstructions and provide for appropriate dredging, consistent with other environmental impact concerns of those shallow portions of the waterway channels;

Institute a system of early warning of possible flooding to reach all citizens in the flood susceptible areas;

Provide for emergency post-flood public services for flood victims, trash and damaged property removal, street and road washing to clean away silt and mud, and appropriate health protection measures to guard against insect breeding.

That petition was carried throughout the community and we delivered them to the county commissioners and to the council with thousands of signatures. Project Flood Control certainly continues in its belief that government has a moral responsibility to protect its citizens against disasters wherever possible.

We are even more certain that the government should not contribute to increasing flood dangers by building sewer lines and allowing development without first planning to compensate for that development. I commend this impact statement, and it is obvious that thousands of hours of work has gone into its preparation. It does an excellent job of tying together all the related impacts of this sewer line project.

However, there are several points which do concern me: One. On Page 137, and I quote: "Grant funds shall be withheld from the proposed project until land rights have been acquired for the Soil Conservation Service Control Structures," and so forth -- it has been quoted many times -- but I would underline this part: "or until other measures are taken, including but not limited to channelization, urban run off controls, developmental restrictions, and other land use modifications which will insure adequate flood control," and it suggests that the grant funds will be removed until there is agreement on other measures to insure adequate flood protection -- unless these agreements are not reached.

As far as we are concerned, this condition is not strong enough for those who live in the flood plain or in its fringes. We want no sewer line constructed until the dams are built. Promises and plans seem to have a way of being diluted by time. We have waited for 17 years for flood protection. Now we are asked to approve significant new development which will increase flooding greatly with only some conditional plans. This is not acceptable.

We would also suggest that a corollary of this position would be to move back by a year or more the cut-off date of January 1, 1976. It is obvious that sight acquisition and dam construction could not be completed by then.

Secondly, the statistical data on flooding came to you from several different sources. We have noticed serious discrepancies within the date from various agencies. The June, 1973, flood was variously described as being from a three year to 20-year flood. Some definitive study needs to be made before we continue with our assumption that the plan for the flood control structures will be adequate.

On Page 107, average annual flood damages are listed for several areas, both within and without the structure. With 80 percent development and the Soil Conservation Service structures, average annual damages are estimated to be $1,900,000. Assuming these figures are correct, we ask the question: How much damage is acceptable? Surely we can plan a program which allows for less than almost $2 million in annual damages.

Thirdly, we are disappointed that the Impact Statement did not consider in greater depth the mitigative measures of purchase of flood plain proterty. It seems that clearing certain areas in the flood plain and possibly adding those areas to the Greenway Syrtem would be more economical than continually building more structures to compensate for additional development.

The Littleton Project near Denver is an excellent example of this approach. I don't believe any agency would find considerable opposition to the purchase of homes in the flood plain. Most persons there would move now if they could sell their property without losing all their life savings in the process.

I ask the philosophical question: Can we afford to build flood control structures forever, or should we attempt to work with nature?

I appreciate the opportunity to be heard this evening, and I ask that you remember two points from my presentation. The first is that I am not opposed to development, but I do believe that future development should, in no way, jeopardize the safety or well-being of those of us who are already here.

Secondly, unless you actually live in a flood-prone area, you cannot imagine the heavy burden of anxiety which one feels each and every time it rains. This is a horrible way to live -- being fearful each time rain occurs. Thank you.

MR. BRIGGS: Thank you, Mr. Langston. In case some more of you are getting warm, we will take a break. We will cover a few more statements and take a ten-minute break.

We call now Anne Taylor, representing the Sierra Club.

MISS ANNE TAYLOR: My name is Anne Taylor. I am a member of the Sierra Club. First of all, I would like to thank the Environmental Protection Agency for its decision to reverse the negative declaration on this -- the impact of this sewer line. We think the mere decision to reverse that negative declaration and the decision to prepare the Environmental Impact Statement has had a beneficial effect already on watershed planning.

This has to be the most interesting sewer line ever proposed. The effects of building, partially building or not building this sewer line reach far beyond the scope of this impact statement. Any position taken is a gamble. The Crabtree Creek watershed is a serious problem in its present condition.

The present problems are the result of development and poor planning in the lower one-third of the watershed. This sewer line opens up the remaining two-thirds of the Crabtree Creek watershed, and it is all upstream. It is such a mess, if it weren't so pitiful, it might be laughable, and we have to clean it all up with tax monies, so the lack of confidence in future expenditures of public monies is perhaps understandable.

The dilemma and the gamble we are forced to take appear to be as follows: Number one, if the sewer line is not built, the Town of Cary could perhaps route its waste into the Walnut Creek sewer line. But, developers would then look to the use of environmentally undesireable sewer package plans to serve the land they want to develop.

The North Carolina Division of Environmental Management would be "very reluctant" to issue permits at this time. The gamble is that pressure for development causes the Division of Environmental Management of North Carolina to become less and less reluctant to issue such permits with (water quality problems resulting.)

Secondly, if the sewer line is installed, but tap ons are not allowed until the SCS flood control structures are constructed as proposed by the Raleigh City Council, what is to prevent the next Council, if it should be different people, from reversing this Council's decision? The gamble: A developer would probably be within his legal rights to demand the right to tap on to the "best available means" of sewage disposal.

Thirdly, if the sewer line is not installed until all 11 flood control structures are under construction or completed, there appears to be a serious lack of confidence that the dams can handle 80 percent development in the upper watershed.

We are concerned that the dams will fully protect the homes flooded in 1973 under the existing conditions. The gamble here is homes and perhaps lives.

It would help somewhat to have EPA, SCS and the Corps of Engineers state unequivocably that their respective projects are planned with the safety and welfare of these people as their prime consideration.

Unless that statement can be made, then the projects should be replanned with priorities adjusted or those citizens given the opportunity to relocate under Public Law 93-251, Section 73, which allows relocation as a flood control alternative.

Fourthly, if the sewer line is extended only to Richland Creek to serve the State Fairgrounds, Carter Stadium area, the completion of the SCS dams must still be a condition. The date mentioned in the Environmental Impact Statement could well be extended to allow completion of these dams, but the sewer line as planned or the sewer line only to the Richland Creek area must have the protection of all the dams, be that as it may.

The gamble once again with partial construction of the line is package plants upstream.

Quite frankly, we found the Environmental Impact Statement to be one of the best we have ever had the opportunity to comment on, and we commend EPA for the depth of its investigation.

We find the statement's recommendation for Greenway planning into this project to be a redeeming factor in a project that is low in benefits save, perhaps, for a select few.

We reluctantly choose not to oppose the installation of this sewer line, but our decision is based specifically on the following conditions:

Number one, that the sewer line not be installed until land is acquired for all 11 SCS flood control structures and bids have been let for their construction.

Secondly, that the Corps of Engineers state publicly its assurance that the development encouraged by this sewer line would not necessitate the eventual channelization of Crabtree Creek. The public cannot be asked to pay several million for a sewer line, several million for flood control and unlimited millions for massive structures through the city where, again, a select few benefit.

We would like to see the omission of the channelization option from the final environmental impact statement.

Thirdly, a public recreation area along the proposed route of the sewer line would benefit the people who are paying for the sewer line. Again, not only a select few and also in the same light, more people would benefit from the dam than a select few.

The sewer line will serve nonexistent development, and the dams, though easier to justify, serve a relatively few taxpayers. At least a Greenway system up to Umstead State Park and around to Cary would provide a form of transportation and recreation which would benefit all of the citizens of Raleigh, Cary and Wake County.

Fourthly, the archeological survey and the vegetative survey should be a part of any such project, and will greatly enhance the education value if a Greenway is put into this sewer line construction.

Maintenance could be through Raleigh's Parks and Recreation as well as Raleigh's Public Utilities Department. Easements would have to be acquired in fee simple.

Fifthly, we emphasize that flood victims should be given the opportunity to relocate under the Corps of Engineers flood control project unless total assurance can be given the citizens in the lower reaches of the watershed that the sewer line will not increase their flooding problems.

Sixth, the County Commissioners cite rising land prices as a deterrent in completion of the 11 SCS dams. We believe that development potential from the installation of the sewer line is one cause of these rising land costs, and we find this an intolerable windfall situation for a small handful of land owners.

Number seven, Wake County Commissioners should adopt subdivision regulations which assure retention of on site run off in order to somewhat alleviate the increased rain storm run off caused by paving streets and building homes and building upstream. The degree of retention should be stringent, in view of the existing downstream situation.

This sewer line proposal has put Raleigh in a very difficult position of gambling on the future. It is not a pleasant situation to be in. We are struck by the similarity of the Environmental Protection Agency's Horsepen Creek Sewer Project in Greensboro, which has thrown citizens there into a very similar dilemma. I hope we can re-evaluate priorities in this case and solve existing problems before we create new ones.

Thank you.

MR. BRIGGS: Thank you, Miss Taylor. Mr. R. A. Dunaway, as a concerned citizen, representing Lake Anne and the Springdale area.

MR. R. A. DUNAWAY: Mr. Chairman, ladies and gentlemen, I am one of those citizens that you have been trying to get involved, but my neighbors have a knack of doing it, and after a few phone calls and a few calls, I decided to come up.

I haven't any statement to give the secretary, but I am just bringing the ideas and the thoughts of the people in my neighborhood.

First, we are in a different situation from most of the county. We are in the highest part of Wake County and we have more to contribute in the way of flood control than we have fear of flooding. We are definitely interested in the sewer line, but we do think it would be foolish to bring the sewer line out and have more development before flooding is brought under control.

Our chief concern -- I won't say it is our chief concern -- but the one that is apt to be overlooked more than any other is the Greenway proposition. Raleigh is recognized as one of the best cities in the country to live in. It has just been declared an All-American city. We know that when the sewer line comes up that development would be fast and we would be in Raleigh.

That best city can be temporary, and we can make it more or less permanent, but it is going to take continuous work to make it permanent. The Greenway was one of the biggest considerations given in declaring Raleigh an All-American city and one of the best places to live.

We would like to see that Greenway not come out to Umstead Park. We do want it to come out there and on to Cary, as my predecessor just said, but we would like to have it come up Turkey Creek and the rest of the county.

When we do become a part of Raleigh, we want to be a part of Raleigh that is the best place to live in. Some years ago -- a few here can remember Will Rogers -- he had a list of what he called the three cities in America that had -- they were different from any other cities. All the others were more or less facsimiles; varied a little.

But, the first one was New Orleans and the second was San Antonio, Texas. I won't name the third because all other cities would like to be it. But, the reason he gave them was the fact that they all had something that Chambers of Commerce could not take away from them.

I mention this in particular because San Antonio is one of those cities. It was the second that Will Rogers mentioned. San Antonio has a little river -- it is not as big, I don't think, as Crabtree Creek -- running right through it, and they have utilized every bit of that -- they have spent millions trying to make something out of that river.

They have backed it up, they have canalized it, they have little ponds, and it has been planted. The Crabtree Creek area is made up of everything from something that a sewer line would be improved -- an improvement on to something you might say the original growth that dates back several thousand years.

That is the type of vegetation. They mention in this draft impact the -- such community as a high aesthetic appeal that represents an advanced stage of ecological succession.

In case anyone doesn't know what that ecological succession is, we will take an old, worn out field, eroded, red clay, nothing will grow on it, supposedly, but in a year or two you do see pines coming up, a few persimmons, black cherries, and such comes up after that, eventually gets up into oaks and ashes and so on.

But, when they get above the tops of the pines, which were the first tree to come in, the pines die. You have got a hardwood forest. The last stage of that is the beech forest. A beech tree will live in one-fiftieth sun light, and it clouds out practically everything underneath it.

Some of this area is that old, the advanced stage of succession, and if this land is disturbed, it is gone, you might say, forever. It is not just the beeches, though. There are other trees. There are -- well, there used to be rhododendron there. When I was a child, why, Wake County was known as the farthest east natural habitat of rhododendron, and I would ride a streetcar out to old Boonesberry Park, go up the creek, and transplanted them around Raleigh.

I don't think any of them lived, but it helped me. Now I wish I hadn't done it. I wish we had it. We do have mountain laurel.

But, this draft of an environmental impact statement I think should be carried all the way through on that vegetative end. State College, I believe, has offered to contribute -- and with its students -- and at the price of only $3,000. Considering the total price of such a study for everything, that is negligible and I think it well worth it, and I think it would be also very much desirable, insofar as possible, when you have to have a right open place for the sewer line to go through, but if you could have a canopy of trees, it would sort of go over it, that would not interfere with anything — any work on it.

But, it could provide a nice place for bicycles or walking, and all of that is desirable and it all boils down to the same thing -- Raleigh is going to go out there. It is going to go out there very fast, as soon as this goes through, and when it does, we want to still be one of the best cities to live in, and I probably won't be living, but we hope most of you will.

Thank you.

MR. BRIGGS: Thank you, Mr. Dunaway. We now call Mr. Tom Adams, Mobile City.

MR. TOM ADAMS: Mr. Chairman, my name is Tom Adams. I am a real estate attorney. I am also a developer, and if I may say so, I am a developer who believes and practices good environmental development. I own some property in the area that is involved. I have some experience there, and I would like to share it with you.

Most of what I would say has been said, so I will omit that portion. Something which has been mentioned, but not explained, is the fact that the Triassic Basin begins in the upper Crabtree Creek.

I would like to tell you what the Triassic Basin means as translated to the development of real estate.

There is a fault line which is known as the Jonesboro Fault, and when you came in on the airplane at Raleigh-Durham, I don't know whether you got in that way or not, but -- it has been fogged in lately -- but, anyway, when you got in there, if you walk across the street in front of the airport and walk about 50 yards, you will have crossed the Jonesboro Fault Line.

Everything east of that line is one formation, and everything west of that line is another formation, and the formation west of that line is the Triassic Basin. The Jonesboro Fault Line runs northeast and southwest. It goes just beyond the Town of Cary and it goes eastward up into the Granville County area, as I recall.

Let me tell you the meaning and what the significance of that is. The Triassic Basin formation at that area is ten to twelve thousand feet thick and it is an ancient geologic fault in the earth. The Triassic Basin is basically a face powder soil with some conglomerates mixed in.

Very, very powdery. It is not uniform, but it is all powdery. Some of it is what is commonly referred to as gumbo. If you step on gumbo, it sticks to your feet and then gumbo sticks to the gumbo, and the only reason you don't keep stepping up higher is because it is mushy and you sink back down through it.

In terms of development, what that means is that the rain which comes in -- comes down onto the earth does not soak in. The rain simply runs off. Consequently, the development of land in that area does not have the same effect as the development of land east of the Jonesboro Fault area.

And the reason is that it will not soak in. If you drill a well up there or dig a well, as the people in the Morrisville area well know, it is rare that you get more than one to three gallons of water per minute, and if you had to rely upon a sustained flow, it is doubtful that you could have one gallon per minute.

There are a few exceptions to that. I will just deviate to say this. There are some rock dikes, igneous rock dikes in the area which come up through the earth. If you are lucky enough to get into one of those, and if it is lucky enough to be into a low area where it can be recharged when surface water comes across it, you may have good water.

Other than that, you have mineralized water, as Mayor Robinson said, and you also have almost none of it. Some of it has a great deal of salt. It is not even fit for human consumption. The only way the area can develop is to have water, and as a practical matter, there must be some type of sewer system, either private or public.

As Dr. Bethel said -- and I wholeheartedly subscribe to that -- you may do all you want to about a private sewer system, do the best job you can, give it every treatment that you know how, and you still have your problems. I don't care how sincerely and objectively you try.

Now, the area up there can develop, but that is the only way it can develop unless there is a public system. I support any plan which requires that we avoid flooding, but, I would call to your attention the fact that as, Mr. Chairman, you pointed out that you noticed the Crabtree was flooded now, or about so.

When we had the rains last year and the year before which flooded the Crabtree with four to five inches, those were times approximately like you find in Raleigh today. This is an ideal time for the hearing. The ground was saturated with water and therefore the water can't soak in. It simply runs off.

And that is what could happen today. If we had four inches of rain the next 24 hours, everything up and down the Crabtree would be under water. I have had experience with a flooded house and I know how that feels, and the gentleman told you exactly right -- you dread to see it rain. You get to where you can't enjoy the raindrops hitting the top of your house and your windowpanes.

I would urge you -- upon you, though, the fact to observe these things: Number one, the only thing which prevents run-off of water in the Triassic Basin is the ground cover. That does arrest the run-off of water. The soaking in of the water does not arrest the run-off of water because it simply won't soak in and you can experiment with that by simply taking a post hole digger and go up there and dig a post hole about a foot or two thick just about anywhere you choose, pour it full of water and come back three or four days later and see how much of it is still there. It just does not soak in.

As the city manager over here would tell you, in the City of Raleigh when they lay water lines, they test them and they require that where there are leaks they be fixed. I can tell you that no test works adequately to prevent leaks except to build one in the Triassic Basin because if you have a leak there it will come right to the top and it will not soak in anywhere and it will be mush all around it right over the top of it where it comes up.

But, that is the situation there because it simply runs off. It does not soak in. It doesn't soak in a bit more than if it were asphalt, except that the flow is arrested on account of the ground cover. The growth in western Wake County may astound you, and the forces of growth in the western Wake County may astound you.

For example, the Town of Cary grew 120 percent from 1960 to 1970, and from 1970 to 1973, it grew another 80 percent in those three years. The Research Triangle Park, which is located in the Triassic Basin, is a very great influence in this area.

A great deal of land has been zoned for industrial use in that general area, and, of course, as has been pointed out, much development will occur once the sewer line is in.

I would like to recommend this to you. Prices today are cheaper than they are likely to ever be again to put this sewer line in. I have not considered the legal consequences which were referred to by Miss Taylor as to whether or not someone could demand to connect to that line.

I suspect that that could be handled and would not be a problem. I would recommend to you that the line be installed while prices are perhaps lower than they will be forever to come, and that provision be made that no tap ons would be permitted and that the legal assurance of that be determined until such time as flood control is assured.

I do not believe in flooding people downstream. I know that there are ways to handle this and there are more ways to handle it than we are presently engaging, if that should be determined to be necessary.

But, it is a desirable time, from the standpoint of economics, of installing it. The developers and people who are interested in having the area grow, and good growth is desirable, they have waited a long time. People who would have put in private package plants a long time ago have been requested to wait and they have waited, and the gentlemen from the State Health Department and so forth will vouch for this. They have waited and they have been cooperative, but to stall until prices go up -- and we face that on the Neuse River up here. We have stalled that out and stalled it out and now it costs several times what it would have cost a few years ago to go on and dam that river up so we would have our water supply for the next 20, 40, 50 years.

But, to stall it simply means we run the price up. It may get prohibitively expensive. We don't need to do that. We need to save the money. I am just as interested in saving federal dollars as I am the local dollar because we are the people who have to supply the federal money from the local sources, so I would urge that the plan which is adopted be one which will assure immediate installation of the line, but which would prohibit the use of that line until such time as adequate flood protection is afforded.

Thank you.

MR. BRIGGS: Thank you, Mr. Adams. The Chair is going to call a ten-minute break. We will come back and start again at 25 minutes till 10:00.

(Whereupon, a short recess was had.)

MR. BRIGGS: Let's get started. Is Mr. Zachary here? The Chair is going to take judicial notice that we have got seven more statements. We have already had 12. It has taken us about two hours. So, we have got at least another hour to go, so you can plan accordingly if you are in a hurry to get out or go somewhere else.

Mr. Zachary, city manager.

MR. L. P. ZACHARY: I didn't bring enough copies, so I will mail the required number in. The City Council of the City of Raleigh discussed and debated this issue at length last Tuesday. Much of the discussion centered around the fact that Raleigh, the Research Triangle, is a very desirable place to live, perhaps one of the most desirable places on the eastern seaboard, because it has grown faster than most any place that I know of.

It is centered on the fact that no visas are necessary in this country and people move where they want to. Many people want to move to this area. In preparation for their moving here, the thinking was that services should be available when this growth takes place.

The city staff has reviewed this statement along with our erosion control section, and the comments were reviewed again by the City Council last Tuesday. These are the official comments of the Council:

Raleigh City Council position concerning the Crabtree Creek interceptor sewer line and the Draft Environmental Impact Statement, EPA Project C-370344. The City Council of the City of Raleigh, North Carolina, supports the construction of the Crabtree Creek interceptor sewer line provided this sewer service extension is performed in accordance with the City Council resolution adopted on February the 7th, 1974, concerning extension of water and sewer service into Wake County.

This resolution is reproduced on Page 224 of this Draft Environmental Impact Statement. The City Council recognizes the need for adequate flood control for the City of Raleigh, and to that end, strongly supports an ongoing program by Wake County, the Soil Conservation Service and other involved agencies, to complete all the planned flood control structures in western Wake County.

The City, therefore, takes the position that the City would permit sewer service to developing areas in watersheds upstream of flood control structures which are in place or under contract to be constructed.

However, the City Council reserves the right not to continue to allow any connections to the interceptor sewer line if, in its opinion, Wake County, the Soil Conservation Service and other involved agencies are not maintaining a reasonable ongoing program of land acquisition and the construction of all the remaining necessary flood control structures.

The City Council feels this policy is needed as the installation of all of the planned flood control structures are necessary to provide areas in Raleigh adjoining Crabtree Creek with flood protection.

Development upstream from Raleigh which will be incurred by the sewer line extension will cause increased flooding unless all of the structures are installed. The City Council feels the Environmental Impact Statement should reflect this position.

And, Mr. Chairman, in the essence of time, our staff has made several corrective notes on pages that are listed in the material that I will submit to you. They will not make much sense read in the context that I have them. I will submit that.

MR. BRIGGS: They will be printed as though read.

MR. ZACHARY: Thank you, Sir.

MR. BRIGGS: Thank you, Mr. Zachary. Mrs. Joyce Anderson, representing Wake Environment, Incorporated.

MRS. JOYCE ANDERSON: Mr. Chairman and members of the Board, ladies and gentlemen, my name is Joyce Anderson. I am president of Wake Environment, Incorporated, whose name we will refer to as WE, We. This is a local coalition of group and individuals who are advocating and working for greater environmental responsibility in Wake County.

These comments were prepared by one of our special task forces which has thoroughly studied this Environmental Impact Statement.

We would like to open our comments by recognizing Cary's need to abandon its deplorable, malfunctioning, undersized sewage treatment plant on Coles Creek. It is only by the grace of an existing SCS flood retention structure which holds the plant's discharges until nature has had time to biodegrade it a little, that the lower regions of Crabtree Creek have been spared extreme quality degradation.

And on the unplanned, but advantageous functioning of the flood retention structure Number 18, WE would like to thank the county's Department of Natural

Resources and the Soil Conservation Service, yet, Wake Environment realizes that this situation cannot be allowed to exist much longer.

Cary must either upgrade its existing plant or it must connect to Raleigh's new treatment plant. It is our opinion that the most cost efficient and environmentally efficient -- that is, in terms of extreme water quality method -- of solving Cary's problem is to connect to Raleigh's system.

The question then becomes how to connect. There seems to be two reasonable alternatives: Either pipe the effluent down Crabtree Creek around Umstead Park and continue around, or pipe the effluent down and pump it back into the Walnut Creek outfall.

Both of these alternatives allow for the needed connections at Morrisville with the private treatment plant at Mobile City and with the proposed new facilities at the Raleigh-Durham Airport.

And there does not seem to be any particular advantage for either outfall since each must have additional capacity built into its lower sections in the future, and that outfall which is utilized will be upgraded sooner in order to handle the greater volume.

Therefore, Wake Environment finds itself hard pressed to recommend either of these alternatives over the other. The only item that Wake Environment can note is the completion of the I-40 and Southern Belt Line facility in the next few years, and if the rapid development generated by these highways will demand that the Walnut Creek outfall be upgraded before such a demand arises for the lower Crabtree outfall, then it may be advantageous to pump Cary's sewage back to the Walnut Creek outfall. These two possibilities should be given a thorough evaluation and discussion in the final Impact Statement with the recommended alternative being completely justified.

If, as Wake Environment has done, one accepts the fact that migration into the Raleigh-Cary urban area cannot be stopped, then one must also accept the fact that the area must have sewers. It would be unthinkable to expect these 50,000 acres which will be developed over the next quarter century to be serviced only by a combination of septic tanks and private treatment plants.

Yet, no sooner than one accepts the idea that massive sewage system is necessary, then one is faced with a whole series of new problems. The following are Wake Environment's assessments of the potential problems and our recommendations for resolving them. I think we all agree that increased flooding is a potential problem developed in the upper Crabtree. The expedient watershed project should be made a condition of the EPA's contract for this project.

By the completion date of the Crabtree sewer line, the Cities of Raleigh and Cary and the county should be required to adopt levies on the amount of impervious service which can be put in any new development. And the third thing we recommend is the Corps of Engineers should be given serious encouragement to include the evacuation of existing flood-prone residences as part of their Crabtree Creek project.

The second potential problem that we foresee is increased sedimentation. The county should recognize that development, no matter where it occurs, is a transition from rural to urban character storm water run-off. And the county should adopt Raleigh's more appropriate requirement for 12,000 square feet rather than the acre requirement, 43,560 square feet of land disturbing activity requiring a sediment control plant, and for ten-year frequency storm water retentions on larger developments.

Construction timing is another potential problem. The EPA should require that Structure Number 11 be under construction before the Richland Creek out fall can be constructed.

Since Structure Number 25 must be the last structure built, there is little reason to consider it at this point. The EPA should expand its contract with the county to clearly show that the county agrees to complete the Crabtree Creek watershed project as planned by January 1, 1980, and that the county recognizes that the EPA will not make reimbursement for any sewer line northwest of Richland Creek until the watershed project is completed.

Thus, the county could proceed on good faith on the orderly execution of both the sewer line and the flood retention structures, and the burden would be on the county to live up to its agreement by the agreed-upon date.

Utilization of open space has more potential. The right-of-way for the sewer line shall be purchased and fee simple, and the land needed for the remaining flood retention structures should be, also.

Thus, a linear open space network will be available for future development as Greenway trails and recreational activity areas linking Raleigh, Cary and Umstead Park.

The flora and fauna in the area have been discussed previously tonight We feel that the EPA should give serious study to the possibility of revegetation along the outermost ten feet of either side of the 13 meter right-of-way with bottom land hardwood vegetation types. There would still be about 12 feet from the actual sewer line which would be adequate clearance and would provide 24 feet for maintenance vehicles and for — and the roots would not pose any problem at the depths of the sewer line.

This would allow for the possible closing of the tree academy at some future time, thus shading out unwanted trash growth and allowing for reduced maintenance costs. This would also be returned to an environment similar to what exists there today.

We appreciate the opportunity to present these comments, and as a citizens' group, we express our desire and our willingness to work in any way we can to implement these suggestions. Thank you.

MR. BRIGGS: Thank you, Mrs. Joyce Anderson. Our next speaker is Mr. Smedes York, general manager, J. W. York and Company. Is Mr. York here?

AUDIENCE MEMBER: I believe he left, Mr. Chairman.

MR. BRIGGS: Mr. F. S. Worthy, Jr., listed himself as a citizen, which is a good occupation.

MR. F. S. WORTHY, JR.: Mr. Chairman, my name is Ford Worthy. I am a citizen. I also am interested in this over-all project. I am a real estate consultant in this area. I have advocated good planning practices ever since I have lived here. I have been a supporter of the Urban Land Institute, which is a national organization, that advocates this type of long-term planning for -- I have been a member or supporter of that for probably 20 years, and I believe this is perhaps, in the 17 years that I have lived -- 18 years in Wake County -- this is perhaps the most significant long-range planning effort that I have seen take place.

It is with great interest that I watch this plan come together because I grew up on the coast. I have watched a lot of areas that didn't have the availability of a central sewer, and there has recently been publicity concerning like Thompson Beach. That is one that comes to my mind, and I think what Thompson Beach could be had they had the planners that would think ahead like the planning people in our Wake County are doing at this time to try to make preparations for growth rather than trying to fight them.

Ever since I have lived in Raleigh, most of the activities that have occurred in the way of utilities expansion, it seems to me that over the years, our city has had a good history of planning ahead for water, but I don't know — I can't say the same about sewer.

I think we have planned ahead for sewer when we saw septic tank runovers. I happen to have a small interest in a piece of property in the general area that will be involved here in the Crabtree watershed.

I have an undivided half interest in a septic tank, and the septic tank works extremely well in dry weather. I feel like that my neighbors — the neighboring property to my property, his septic tank doesn't work quite as well as mine, so I am getting some of his runoff. I think this is the real key.

Now, I have worked hard to help Wake County acquire some of these dam sites, and I think that the flood control is of an extremely high priority. But, I think the highest priority is for us as a community to take advantage of the opportunity of planning ahead and going ahead and doing this sewer system now while the development is sparce.

I commend the EPA for such a comprehensive report. As a real estate consultant, I write reports and I know that to put together a package like this it takes a lot of doing, and I think you have been extremely meticulous in trying to do a good job, and I commend you for that and I hope that you will -- I think it is a good compromise.

There are always extremists on either side, some people that would like to have started yesterday and run full speed ahead, and others that would like to postpone it and postpone it and postpone it to death, and I think the time has come now while we have an opportunity to have participation between the county and the state and the federal government to do this project. I think the time has come to do it now.

We have talked about it long enough.

MR. BRIGGS: Thank you, Mr. Worthy. Mayor Fred Bond, Town of Cary.

MAYOR FRED BOND (Cary): Mr. Chairman and members of the panel, if I may, I would like to make a very brief statement and ask our town planner, Mr. Elam, to come up to give the prepared text there.

A good bit has been said about the Town of Cary and its problems. It is all related to growth. One speaker, I believe, said we have grown 123 percent. But, since '70, we have doubled in population in five years by 13,500 at the moment.

Now, this brings on a lot of problems -- sewer being one, water being one, among many others. And about four years ago, in 1971, the Town of Cary passed a bond issue for several items, including water and sewer, with the sewer matter being tied to this interceptor.

As a matter of fact, the State of North Carolina has condemned our Coles Branch Treatment Plant. But, in view of our request for extensions and delays, hoping to get tied to the interceptor, they have worked with us. And here it is 1975, and we are still waiting for -- to solve that problem, so we are very anxious about this. We are indeed anxious about it.

Another area that we are trying to work on that has, I think, a bearing here is that we are trying to develop some recreational facilities in joint venture with Wake County at one of these lakes. I believe it is Lake Number 3.

This is a beautiful lake and the water is fine, but we are concerned that if we don't get this sewer installed that the quality of this water, because of the surface water coming into that lake, can be detrimental and probably not of any great use for recreation.

I think this would be true of other lakes in the area. So, we are anxious about it. We are concerned about it and we would certainly hope that we move expeditiously to the completion of this project.

Now, if Mr. Elam may present you a very brief statement, I would appreciate it.

MR. BRIGGS: Okay. Thank you, Mayor. Mr. Charles Elam, director of planning.

MR. CHARLES M. ELAM: Mr. Chairman, I would like to take this opportunity to thank the Environmental Protection Agency, on behalf of the Town of Cary, North Carolina, for providing us a means to comment on the Draft Environmental Impact Statement.

During the review of the Impact Statement, a number of items were found to conflict with policies and planning processes adopted by the Town of Cary. I will address these items in the following statement as they relate to sections outlined in the Environmental Impact Statement.

Item one: The Town of Cary has adopted a future land development plan through 1990. This plan is presently being updated by the use of watersheds as planning units. These watershed planning units will help develop criteria for the following items:

A. Urban runoff controls for each basin;

B. Development restrictions for each basin; (these restrictions will enable the town to plan for each basin without overloading any one basin with more density than it can physically support.)

C. Transportation and sewage outfall planning is in progress at the time of writing;

D. School sites, recreation sites, open-space and Greenway systems are being planned at the present through each watershed and will be updated yearly;

E. The Town of Cary has adopted, by resolution, the water and waste water master plan for Wake County. If this plan is implemented as proposed, it will greatly reduce the effluent discharge into Crabtree Creek and its tributaries;

F. The Town of Cary has adopted a 50-year Floodplain Ordinance and Erosion and Sedimentation Control Ordinance. The Erosion and Sedimentation Control Ordinance requires the impoundment of water up to a ten-year frequency storm;

G. Surveys of construction rights-of-way for future sewage outfall lines have begun in each basin in the upper Crabtree watershed.

The previously mentioned items will also help determine certain unique vegetative communities which are desirable for use in proposed Greenway systems and recreational uses.

Item Number two: I would like now to comment on a part of the summary sheet in the Environmental Impact Statement, (Page IV, Subsection B. Secondary, a. Flooding), which the EPA states the following:

> Development of the upper Crabtree Creek basin associated with the proposed project will increase the probability of damages from flooding in downstream areas. The completion of the SCS flood control project is one method of metigating this adverse impact. Grant funds shall be withheld from the proposed project until all land rights have been acquired for Soil Conservation

Service control structures located within each proposed service area, or until other measures are taken, including but not limited to channelization, urban runoff controls, developmental restrictions, and other land use modifications which will insure adequate flood control as determined by the State of North Carolina, the SCS, the COE, and the EPA. Grant funds shall be withdrawn January 1, 1976, from the proposed project if land rights are not acquired for the SCS structures or agreement on other measures to insure adequate flood protection is not reached.

The Town of Cary has implemented or is in the process of implementing every item mentioned in the previous statement. The Town, by zoning restrictions, controls a major portion of all the land and watersheds in the upper Crabtree Basin.

In the near future, we will be extending our extraterritorial zoning limits to encompass the remaining basins. Planning for these basins is in progress at the time of writing.

Item Number three: All items mentioned throughout the Impact Statement, such as septic tank constraints in areas with poor soil suitability, geology studies, ground water supply and recharging areas, pollution control for point and nonpoint sources of pollution, additional water supplies for the town, participation in the 208 waste water management plan, and controls in the amount of runoff that will be allowed in each basin in the future are at present underway or completed.

In summary, the Town of Cary at present is polluting Coles Branch because of an outdated waste water treatment plant located in the Coles Branch watershed. This pollution eventually ends up in Raleigh and many other municipalities water supply located in lower portions of the Neuse River basin.

The completion of the proposed Crabtree outfall line will eliminate the need for operation of waste water treatment facilities by the Town of Cary and will route all waste water to a modern treatment plant, thus eliminating a great amount of pollution that is presently being discharged into Coles Branch and Neuse River basin.

I strongly feel we have prepared for the responsibility of controlling urbanization with the most comprehensive planning processes known. I further feel we can control any major impact from the proposed project as they relate to land use and development.

If construction for the proposed outfall line were to begin tomorrow, by project completion, the Town of Cary would have implemented each watershed planning unit into policy and set development guidelines for the same.

I would hope that this statement which I have presented to you tonight will have a positive effect on the proposed development of the Crabtree outfall line. We in Cary desperately need a new outfall line and have prepared ourselves in every way possible to compensate for positive and negative effects that may be encountered.

The future growth and development of Cary and much of western Wake County is dependent upon the completion of the Crabtree outfall line. It is, without question, our number one priority and greatest need. We in Cary stand ready to work toward the solution of any problem that impedes completion of the Crabtree outfall project.

I thank you, again, Mr. Chairman.

MR. BRIGGS: Is Mr. Smedes York here? Okay. We call on Mr. Robert Giles for him to complete his statement. Mr. Giles, you may take such time as you need to complete your statement.

MR. GILES: Thank you very much, Mr. Chairman. I know the hour is getting late, so I am not going to really read the rest of my statement, but I will talk from it and try to finish here in just a few minutes.

One point I would like to make in expressing some difference of opinion with the Draft Impact Statement really comes down to this. I don't believe there should be a halfway sewer line or a partway sewer line or halfway or partway flood protection.

Now, I refer to the item in the Impact Statement which reaches the conclusion that the line could go partway up to serve the area in the vicinity of the State Fairgrounds, the Richland Creek basin, provided rights to property for Structure 11 and Structure 25 are obtained.

I don't believe that that is really a sound conclusion, and I think the reason is this. If that line is put up there, there is going to be a great deal more development in that area than there would be otherwise, and that development is going to contribute significantly to the flood problem downstream.

I don't think there could be any question about that. And the fundamental proposition that the Impact Statement has already reached and to which I have referred on Page 153 is further development of the Crabtree basin should not contribute to the damage to property and endangering of lives downstream. I think that is a good conclusion and one that should be stuck with, adhered to and accomplished.

Now, I am quite willing to assume that there is a problem in the State Fairgrounds area and that the State -- several state agencies are at capacity. Now, I would simply say that if this was the only problem that we were taking care of, we wouldn't be running a 48-inch sewer line up that creek.

You would so something else. And that obvious alternative probably would be to increase the state facilities that are already there, pumping facilities and lines, and send the waste water over the crest to the Walnut Creek line.

The point is, even extending that line part way up, the only basis for the justification is to take care of future development, as I see it.

Now, gentlemen of the panel, if a citizen downstream has got five or six feet of dirty flood water at his place of business or in his home, his misery is not going to be reduced one iota if he is told: "Now, this wasn't private development this time which added the extra punch to this flood. This was your state government."

That is not going to help him one bit. So, I would express a most serious question about that part to the Impact Statement and urge your reconsideration. At Page 107, there is a statement of estimated average annual flood damages for just two areas, and the Wake Forest Road, Farmers Market area, and the Crabtree Valley Mall area, the estimated annual damage at 80 percent development in the upper basin, with the 11 flood control structures in place, is $1.9 million.

Now, just applying simple arithmetic, that comes out, Mr. Chairman, to $19 million every ten years. Now, we are just talking about two places there, and most of that damage obviously would be sustained by businessmen.

Now, I would just like to ask a rhetorical question, and that is whether the Chamber of Commerce has really called this particular part to the attention of its members and particularly those members there? $19 million in ten years? Now, of course, all of that 19 could hit in one year.

You know how facetious and fickle floods are. Sometimes the two five-year floods that you are supposed to get at least five years apart, sometimes they come within five months of each other, and I am just talking dollars and cents on the same basis that I would assume the members of the Chamber of Commerce are required to deal.

I simply can't imagine that the members of that organization have read this report closely, or if they have some question about it, to question those figures and estimates, then they ought to come up with different conclusions and say well, that is not right.

But, if anything, based again on the statistics that I have been able to study on the matter, I don't think those statements are overstated. If anything, I think they are understated for the reasons that I have tried to spell out in raising the questions about the adequacy of our present flood structure plan.

Mr. Chairman, I would like to make a few comments on the aspect of the Impact Statement that has reference to packaged treatment plants in the upper basin.

The Impact Statement seems to indicate -- and perhaps correctly so -- that land development made possible by a planned system of gravity sewer lines is likely to be more orderly and present less problems than development made possible by the so-called package treatment plants, and that is assuming that the quality of the waste water treatment is all right.

And, then, there seems to be some indication that if the major sewer line is not installed, then some substantial development utilizing privately-owned package treatment plants must be anticipated. Now, I question that. As the Impact Statement notes at Page 71, approval for such package treatment plants is required from the state office of Water and Air Resources, and a permit is required from the United States Environmental Protection Agency.

Now, even assuming that these proposals for package treatment plants really measure up in terms of water quality treatment -- and many of our speakers have indicated, and I am sure with good reason, that whatever is done in that area is always going to be suspect -- there is another consideration, and this is the main point that I want to make, and that is: Is it conceivable that the state agency and EPA would completely ignore the devastating addition to the flood conditions that such development would produce any more than they could ignore such consequences produced by development serviced by gravity sewer lines? I don't think so.

Because, if that were done, I believe that would constitute a serious question under the applicable statutes and regulations designed to protect the public from adverse environmental impact, both for the federal agency and the state.

There is very specific language in the federal regulation which says that issuance of a permit is a significant -- or can be a significant action and very specifically says, as an example, that in considering the issuance of permits, the cumulative effect must be taken into account. You just can't look at one little old permit for one little package plant and say well, now, this particular installation is not going to cause a great big flood because if you issue a permit to one, you have got to treat others on a similar basis.

I simply am suggesting and urging that you think through that and do not include anything in your final Impact Statement which seems to say we don't really have to consider environmental impacts if we are talking about issuing permits because I believe you do, and I hope that you would.

A few summary observations. I think it is important for all of us to understand the central and primary factors that are involved in this proposed sewer line project. I believe the impact statement sites facts and figures that make it very clear, if there was ever any doubt, that this project cannot, by any stretch of the imagination, be justified on the grounds that it would take care of an existing waste water disposal situation, or an existing public health situation.

The facts and figures just don't bear it out. Now, I am not suggesting and would not for one moment question Dr. Bethel's statements or conclusions that that is not good area for septic tanks or good area for package treatment plants. I am saying that if you were correcting what is there now to the extent that it needed to be corrected, you would never do it with this particular sewer line project, not in a million years.

For example, the Coles Branch Cary Treatment Plant serves only about 500 of Cary's approximately 10,000 persons. Obviously, if that were the thing you were going to correct, you would tie that situation in to the Walnut Creek interceptor. Economics and everything else would point to that.

Example: The State Fairgrounds situation. If that is the only thing you want to take care of, you wouldn't run a 48-inch line up that creek basin. You just wouldn't. What would you do? Well, you would tell the state you would put a little money in there and you would fix up your facilities and another pumping station, increase your capacity, and shift it over the crest to the Walnut Creek line where it is going now.

Yes, take care of those situations. I do not argue against that, but I would argue against justifying this project on the basis of taking care of some present critical problem. On Page 21 of the statement, it says the proposed Crabtree Creek sewer interceptor is designed for a population in excess of 80,000. On Page 21 of the statement, we are told that the interceptor, excluding the temporary population at the State Fairgrounds and Carter Stadium areas, will serve a combined present population of 1,000. One thousand versus 80.

Now, the citizens in the northwest community sector are not, by any means, opposed to development as such. Without any question, I think it is in the interest of the future economic welfare of Wake County that we have a great deal more development in this county, and from the information available to us, it seems that much of the upper Crabtree basin area is far more suited to development than it is for agricultural use, and I, for one, would not wish to see agriculture disappear as a significant economic factor in Wake County, and I would rather see extensive commercial and residential development take place on the land which is least suited for agricultural purposes.

But, we do not want, and we cannot afford, the kind of development which is haphazardly conceived just to reap benefits for a few people, at the risk of countless other citizens, and, I would suggest, at the risk of undermining the future financial stability of local governmental units in Wake County.

I think the day has passed when we can afford, if indeed it ever made sense, to fling out sewer and water lines here and there and just assume that whatever comes to pass from those first steps will all just be dandy.

Now, I know none of us subscribe to that statement I made. None of us would say well, I believe we ought to do it. But, I would like to emphasize -- I think it is relevant for purposes of this hearing, Mr. Chairman -- we had the scrap to get this Impact Statement ever written. It was an uphill battle, and I didn't get any support from the County Board of Commissioners, I can tell you.

I didn't get any support from the Chamber of Commerce. Now, that is all in the past. I simply want to try to pull this together to emphasize this point, and that takes into account the conflicting interest, the need for Cary to have a gravity sewer line so they won't have to do a lot of expensive work on their present system.

The need for the State Fairgrounds area, the need for the other areas. The need that we will do what we ought to do so that, in Dr. Bethel's term, we won't have to go around hanging our head in shame because of our present sewage matters.

But, I think it would be wrong -- dead wrong -- to go ahead with this project unless we do take care of -- and I mean take care of -- the flood problem. It has been 17 years. I don't know why we didn't get going back there in 1969. We had the bond money. Nothing was done, apparently. I don't know why.

This report speaks -- well, land value has gone up and there is speculation. That is disturbing. I don't know why. I think the people in this county would fully support the County Board of Commissioners if they know what is going on; if they are told.

I support the proposition that owners of the land here should receive just and fair compensation, not exorbitant, speculative profits. And, as far as I know, not one case has been carried into court. And, in this situation, the county has got eminent domain authority. There is no reason for the county to agree to pay speculative, exorbitant prices, unless a jury says so.

I would like to emphasize it is my belief that the present County Board of Commissioners is the only one that has really got behind this flood project and done something and made a lot of progress this past year, and that is why I don't think it is good to put on this arbitrary cut-off date. I believe our present Board will do what has to be done if they are given a chance, and I believe the public will support them.

We are not asking that the State Department of Natural and Economic Resources and the Environmental Protection Agency do anything more than meet their own responsibilities under the law with respect to the environmental features. We know that putting up flood control structures, putting every one of them up and putting in the sewer line, is not going to guarantee that we will have nice, orderly development up there. You are not going to have it that way.

It is going to take some decisions by local government, county, the City of Raleigh and the Town of Cary, and some of those decisions are going to be hard ones. There again, I believe that we can have that kind of decision in Wake County, and I believe it is what the public wants and will support.

I think Mr. Adams raised a very interesting point and one that I hope will be given consideration, and that is, put in the sewer line, but just don't let new development tap on. I would be very willing to support that, provided it was clear that that particular procedure and approach was fully justified and would work. It may be well that a little special bill introduced in the North Carolina General Assembly and supported by all of the governmental units in this county would make crystal clear that our local governmental units have the authority to enter into that kind of agreement with EPA.

I am not suggesting that EPA put that restriction on because I am not sure you have got the legal authority, but you might have the authority to enter into that kind of agreement where the county, other units involved, commit themselves not only to EPA, but to the citizens in this county as to what they will do.

Anyway, I think that is something that is worthy of consideration. I am after and speaking for, on behalf of our citizens, adequate flood control, adequate sewer systems and a good future climate of economic development.

I believe we can get all of those things, and I hope we will put them together. Thank you.

MR. BRIGGS: Thank you, Mr. Giles.

Is there anyone else here who would like to make a statement? Okay, then. I would like to make one comment, to remind you again that written statements can be submitted for the record until April the 1st, and for your information, it usually takes half of that time, probably takes us something like 60 days, to complete the impact statement, to prepare the final impact statement, and those of you who do not know and those who do, I will remind you, once the impact statement is completed, we have to have it on file with the Council of Environmental Quality for 30 days, after which time we can render a decision consistent with the impact statement and tell the county they can begin or cannot begin the project, and under what conditions they can begin the project, if they can.

If there are no other statements to be made, then the public hearing is concluded.

(Whereupon, the hearing was adjourned at 10:30 o'clock p.m., March 13, 1975.)

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This is to certify that the attached proceedings before the Environmental Protection Agency in the matter of:

The Draft Environmental Impact Statement on the
Crabtree Creek Sewer Intersector

State Highway Commission Building, Wilmington
Street, Raleigh, North Carolina

was held as herein appears, and that this is the original transcript thereof for the file of the Agency.

Susan Gay Hess

Susan Gay Hess
Official Reporter

APPENDIX 12

WRITTEN COMMENTS

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
Southeastern Area, State and Private Forestry
1720 Peachtree Road, N.W.
Atlanta, Georgia 30309

April 2, 1975

Mr. David R. Hopkins
Chief, EIS Branch
Environmental Protection Agency
Room 208 - 1421 Peachtree St., N. E.
Atlanta, Ga. 30309

Dear Mr. Hopkins:

Here are U. S. Forest Service, State and Private Forestry comments and questions on the draft environmental impact statement for the Crabtree Creek, Ware County, North Carolina Interceptor Sewer Line Project.

Project provisions to maintain a 10 meter (minimum) buffer strip between Crabtree Creek and the sewer line R/W for erosion and sediment control and to conduct a vegetative survey of the R/W to determine the least destructive routing of the sewer line are commendable. However, we question the need to maintain the full 40 foot width of the R/W clear of trees and shrubs. As a minimum, those trees along the R/W line which do not survive construction damages (such as severance of lateral roots, soil compaction, disturbance of natural drainage, the piling of dirt above tree root collars, etc.) should be replaced immediately.

To the extent possible, turns should be designed into long straight segments of the line of sight along the R/W.

The project proposal points up the potential for multiple-purpose use of the R/W. Multiple use of the greenspace is certainly most desirable. However, attainment of the widest range of beneficial uses of this natural environment without degradation, risk to health or safety, or other undesirable or unintended consequences as required by N.E.P.A., cannot be left to piecemeal, single purpose planning. Therefore, we recommend that multiple use of the total R/W (for hiking, bicycle trails, conservation education, etc.,) be fully considered and incorporated in the project design and that a fully coordinated plan for multiple use of the R/W be made a part of this project proposal.

Among stated benefits of the project are stimulation of the rate of development and allowances for increased densities in the project service area. Without a comprehensive land use plan for the Upper Crabtree Creek Basin, how is the public investment in the project and public concern for maintenance of environmental quality safeguarded against unsuitable development within the flood plain and possibly over-development in portions of the basin?

This is a good Environmental Impact Statement. Thank you for the opportunity to review and comment on it.

Sincerely,

PAUL E. BUFFAM
Area Environmental Coordinator

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
P. O. Box 27307, Raleigh, North Carolina 27611
Telephone 755-4210

March 10, 1975

Mr. David R. Hopkins
Chief, EIS Branch
Environmental Protection Agency
Room 208 - 1421 Peachtree Street, N.E.
Atlanta, Georgia 30309

Dear Mr. Hopkins:

The draft environmental statement for Crabtree Creek, Wake County, North Carolina, EPA Project C370344 that was addressed to the U.S. Department of Agriculture on January 31, 1975 was referred to the Soil Conservation Service for review and comment.

We have reviewed the statement and our comments follow:

1. Page 25, fourth paragraph, lines 14 and 15 should read; "--(Personal Communications, Mr. Robert Kirby, Soil Scientist, SCS, IPA Wake County Planning Department, 1974.)"

2. Page 27, third paragraph, correct spelling of Chewacla Series on third and seventh lines.

3. Page 54, first and second lines should read; "--Conservation District. (Later subdivided into the Wake Soil and Water Conservation District, Durham Soil and Water Conservation District, Orange Soil and Water Conservation District and Wilson Soil and Water Conservation District)--."

4. Page 55, first line should read; "--Engineers. Table 6 shows the available design data for the remaining structures."

5. Page 55, third and fourth lines should read; "To implement the plan, the Crabtree Creek Watershed Improvement District was formed."

6. Page 55, lines 17 and 18 should be corrected to show structures 1, 13, and 22 are under construction.

7. Page 58. The SCS floodwater retarding structures alone will not provide a 100-year frequency level of protection. The associated channel work now being studied by the Corps of Engineers and the appropriate land use controls above the structures must be added to provide protection from the 100-year frequency flood event.

8. Page 88, third paragraph should read; "The original proposal for high manholes has been changed to provide sealed, bolted-down covers. Plans call for a vent which should be above the 100-year flood level as defined by the SCS Flood Hazard Analysis of the upper Crabtree Creek basin."

9. Page 138, paragraph 1. The writing of this section could lead one to believe that the Soil Conservation Service could and would build structures 11 and 25 even if the land rights on 5A, 20A, and 23 were not obtained. The Service would build structure 11 without the others. However, the plan and design of structure 25 is based upon 5A, 20A, and 23 being placed. If structure 25 were built without these three, its plan and design would have to be changed substantially.

Other comments are as follows:

1. Observations of current sewer line installations indicate actual right-of-way use following standard construction practices involve considerably more than a forty foot right-of-way to allow for proper water management and erosion control where any cuts or fills are made in conjunction with the installation of the sewer line. Adequate right-of-way should be obtained to insure that stable cut and fill slopes can be obtained during construction. Temporary and permanent surface water disposal easements should be obtained in conjunction with construction right-of-way easements to facilitate the management of surface water run-off from the sewer line right-of-way during and after construction to reduce the cost and improve the quality of the erosion and sediment control phase of the project.

2. The use of the phrase "skirts around the SCS control structures" does not exactly correlate with on-the-ground observations of the proposed sewer line location and the location of the Crabtree Creek Flood Control structures. On-the-ground locations of the sewer line and the existing and proposed flood control structures indicate the sewer line will pass through the flood control dams. This fact emphasizes the need for close coordination of the dams. In the interest of both projects, it is recommended that at least that portion of the sewer line under or through the dam be installed prior to or as an integral part of the construction of the dams.

3. Permanent stabilization of the construction right-of-way should include appropriate shrubs and ground covers, as well as grasses, to reduce long-term maintenance costs as well as erosion and resulting sedimentation. The use of wildlife food-producing perennials for this purpose would be desirable.

4. The inference on Page 146 that the urban run-off control incorporated in the Raleigh and Wake County sediment control ordinances will provide a degree of flood control of Crabtree Creek is misleading. The level of flooding that would occur with and without these controls would be substantially the same for a storm of any appreciable significance. These urban run-off controls are for the purpose of erosion control and do not provide either sufficient storage or retention time to significantly affect flood levels in Crabtree.

5. The report does not address itself to alternative productive uses of the land involved in the sewer line right-of-way or the productivity of the land area that will be indirectly affected by the installation of the sewer line.

The Soil Conservation Service assists soil and water conservation districts in technical phases of their program. If desired, consultive services that are consistent with priorities for work established by the districts are available from the Service in reviewing or developing plans for controlling erosion during and after construction.

We appreciate the opportunity to review and comment on the proposed project.

Sincerely,

Jesse L. Hicks

Jesse L. Hicks
State Conservationist

cc: Council on Environmental Quality, 722 Jackson Place, N.W., Washington, D.C. 20006 (5 copies)
Office of Coordinator of Environmental Quality Activities, Office of the Secretary, U.S. Department of Agriculture, Washington, D.C. 20250
K. E. Grant, Administrator, SCS, Washington, D.C.
Grady Lane, Director, State Soil & Water Conservation Committee, Raleigh, N. C.
David L. Dixon, Area Conservationist, SCS, Raleigh, N. C.
Clyde S. Sawyer, District Conservationist, SCS, Raleigh, N. C.

Page 58, last paragraph: "The Wilmington District of the Corps of Engineers is studying Crabtree Creek from SCS structure No. 25 to the Neuse River in an effort to reduce the remaining flood damages, develop the recreational potential, and upgrade environmental quality. The proposed project interceptor and the associated development will affect this COE study by increasing the flows and stages that must be accommodated. The Corps study allows for considerable citizen participation through citizen committee and public meetings. A list of problems, needs, and possible solutions has been prepared..."

Page 70, last sentence: "The CCCAC was formed as a part of the public participation program initiated by the Corps of Engineers in their study of alternatives for Crabtree Creek between SCS structure No. 25 and the Neuse River."

Page 105, last sentence: "The Corps of Engineers, Wilmington District, has computed average annual dollar damages to existing downstream development from flooding for conditions with and without future urban development in the watershed and with and without the SCS control..."

Page 106, 1st paragraph: "...structures (Table 10). As may be seen from this table, 80 percent development of the watershed would raise average annual damages to existing downstream development from $3.7 million to $5.7 million if the SCS structures were not built. If the structures are built, then even with 80 percent development, average annual flood damages are estimated at $1.9 million or about half the damages under existing conditions without the SCS structures. Table 10 also shows that the increase in average annual downstream flood damages caused by 80 percent development is less with the SCS structures than without the structures. ...Flood stages with 80 percent development of the Crabtree Basin with the structures are shown to be three or four feet lower than with existing development without the SCS structures."

Page 107, Table 10: Change the title to: "Existing Average Annual Flood Damages Along Crabtree Creek from SCS Structure No. 25 to Neuse River" (also make change on p. v). The following footnote would aid in interpretation: "Existing average annual flood damages are those expected to occur in any year over a 100-year period given the probability of various flood events and the existing level of downstream development."

Page 136, 2nd paragraph: "The Corps... these dams. Under the present conditions (existing development without SCS structures), average annual flood damages to existing downstream development are estimated to be $3.7 million. Completion of the structures would reduce these average annual damages to $1.4 million, an average annual savings of $2.3 million. However, an assumed 80 percent development of the watershed after the structures are built would increase average annual damages from $1.4 million to $1.9 million. This increase is $1.5 million less than without the SCS structures. Adherence to land use..."

Page 137, line 9: change "elimination" to "reduced."

Page 137, lines 13 and 14: "area, or until other structural and non-structural measures are taken, including but not limited to channel improvement, floodproofing, urban runoff controls,..."

Page 137, next to last line: "...agreement on other measures to insure an equivalent amount of flood..."

Page 138, 2nd paragraph, 3rd sentence: "These ordinances are designed to prevent or minimize future development on the flood plain which would otherwise tend to increase average annual flood damages."

Page 143, line 16: Change "existing" to "future development."

Page 146, 1st complete paragraph, 2nd sentence: "Since an urban runoff ordinance has been passed, some of the increased damages assumed by the Corps of Engineers due to future upstream development with the structures as compared to existing upstream development with the structures will be avoided."

Page 146, section d: Change "Channel Improvements" to "Downstream Flood Protection Measures" (also make change on p. ii). Change paragraph to read: "The Corps of Engineers (COE) is investigating alternatives to control the remaining flood problem along Crabtree Creek from SCS structure No. 25 to the Neuse River (Chapter II). This study will provide the necessary information on the costs and benefits attributable to various non-structural and structural measures (Appendix 6) and the environmental and social impacts of each. From this analysis a recommended plan will be selected to provide additional flood protection."

In addition, the Falls of the Neuse Reservoir is now under construction. Removal of the words "proposed" and "controversial" used in describing this project on pages 40, 44, 113, and 124 is suggested.

Overall, the draft EIS was thorough in its analysis and presentation of the impacts of the proposed interceptor sewer line and clearly stated the need for completion of the SCS flood-retardation structures as soon as possible. Thank you for the opportunity to extensively comment on this draft. My planning staff wishes to commend Mr. Bob Howard for a job well done.

If you have any questions on our comments, please contact Mr. James O. Waller, our Crabtree Creek Study Coordinator (919-763-9971, ext. 550).

Sincerely yours,

Pleasant H West

PLEASANT H. WEST
LTC, Corps of Engineers
Deputy District Engineer

Copy furnished:
Mr. Timothy Atkeson, General Counsel
Council on Environmental Quality
Executive Office of the President
722 Jackson Place, NW
Washington, DC 20506 (5 cys)

DEPARTMENT OF THE ARMY
WILMINGTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1890
WILMINGTON, NORTH CAROLINA 28401

SAWEE

12 March 1975

Mr. David R. Hopkins
Chief, EIS Branch
Environmental Protection Agency
Room 208 - 1421 Peachtree Street, N.E.
Atlanta, GA 30309

Dear Mr. Hopkins:

We have reviewed the draft environmental impact statement (EIS) on Crabtree Creek, Wake County, North Carolina, EPA Project C370344, and our comments are as follows:

We concur with the conclusion of the draft EIS that completion of the Soil Conservation Service's (SCS) upstream flood-retardation structures is necessary to reduce the existing serious flood problem along Crabtree Creek in Raleigh. Additional runoff from future development of the watershed should also be controlled so as not to further increase flood stages and endanger property and lives in downstream areas. Immediate action to facilitate completion of the SCS structures is imperative. Only then can any downstream non-structural or structural flood control measures be fully effective.

As shown by our flood damage estimates on page 107 of the draft EIS, average annual flood damages to existing downstream development under present conditions (existing development without the SCS structures) are estimated to be $3.7 million. Completion of the structures would reduce these average annual damages to $1.4 million, an average annual savings of $2.3 million. However, an assumed 80 percent development of the watershed after the structures are built would increase the remaining average annual damages from $1.4 million to $1.9 million. Alternatives to reduce the remaining $1.9 million in average annual flood damages will be presented as soon as we have completed our evaluation of them.

We also note with interest that a multi-purpose project right-of-way presents an excellent opportunity to commit flood-plain lands to the Capitol City Greenway.

In order to clarify the role the Corps of Engineers has in the analysis and solution of the remaining downstream flooding problem along Crabtree Creek, we offer the following suggested changes in the text for your consideration:

Page ix, last two lines: "...each proposed service area, or until other structural and non-structural measures are taken, including but not limited to channel improvement, floodproofing,..."

Page x, lines 2 and 3: "...other land use modifications which will insure an equivalent amount of flood protection as determined by the State of North..."

Page xiii: "...Crabtree Creek Citizens Assistance Committee..."

Page 21, 2nd complete paragraph, last sentence: Crabtree Creek is significantly longer than 20 miles from its origin to the Neuse River.

Page 54, last two lines: "...and the need for flood damage reduction measures below structure No. 25 is being restudied by the Corps of..."

Page 55, line 2: "...remaining SCS structures."

Page 55: Addition of the following paragraph to the bottom of the page would aid in visualization of flood damage potential. "The two largest floods on record occurred in February and June 1973 and flooding along lower Crabtree Ceek was extensive. According to Corps of Engineers damage estimates, the two floods caused a total of $13.3 million in residential and commercial property damage."

Page 57, SCS project map: The downstream channel modifications shown on this map are those originally proposed by the SCS and are not to be construed as measures proposed by the Corps of Engineers. The alternative downstream non-structural and structural flood control measures for Crabtree Creek are still being evaluated by the Corps and will be presented as soon as the evaluation is completed.

Page 58, 1st paragraph, 2nd sentence: "Figure 16 gives the projected flood stages as determined by the Corps of Engineers for four conditions: existing development with and without the SCS structures and 80 percent watershed development with and without the SCS structures."

DEPARTMENT OF THE ARMY
WILMINGTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1890
WILMINGTON, NORTH CAROLINA 28401

SAWEN-PP

21 April 1976

Mr. Bob Howard
EPA - EIS Staff
1421 Peachtree Street
Atlanta, Georgia 30309

Dear Mr. Howard:

This letter is in response to your request today for sending you the latest damage estimates for our Crabtree Creek Study as soon as possible. As I mentioned to you on the phone, the latest damage estimates are much less than we had previously reported. The reason for the difference is that a field check of the City of Raleigh topographic maps showed that the maps were not accurate enough for our studies. The city topo maps had been used by us to determine elevations of structures for use in our damage calculation program. Subsequently, we conducted a field survey to determine the actual elevations. The result was a drastic decrease in the level of damages.

After a quick review of the January 1975 draft EIS for EPA Project C370344, I believe that the only numerical changes that need to be made will be on pages 106 and 107 of that report. I am enclosing corrected copies of those two pages. Naturally, any of our 12 March 1975 comments that you have incorporated should be adjusted to agree with these latest dollar amounts. I trust that this information will meet your immediate needs.

Sincerely,

John M Deponai III

JOHN M. DEPONAI III
Study Manager
Crabtree Creek Study

2 Incl
as

EPA-IMPACT [illegible]

[illegible]

FEDERAL POWER COMMISSION
REGIONAL OFFICE

730 Peachtree Building
Atlanta, Georgia 30308
February 24, 1975

Mr. David R. Hopkins
Chief, EIS Branch
Environmental Protection Agency
Room 208 - 1421 Peachtree St., N. E.
Atlanta, Georgia 30309

Dear Mr. Hopkins:

We have reviewed the Draft Environmental Impact Statement for the construction of an interceptor sewer line to Wake County, North Carolina, to service the upper drainage basin of Crabtree Creek, EPA Project C370344, which was received with Mr. Jack E. Ravan's letter dated January 31, 1975.

Our primary concern with projects or improvements that affect land and water resources is their possible effect on matters involving the Commission's responsibilities. Such responsibilities relate to the assurance of reliability and adequacy of electric service and the development of hydroelectric power under the Federal Power Act, and the construction and operation of natural gas pipelines under the Natural Gas Act.

Staff review of this DEIS indicates that the proposed sewer line should have no significant effect on any hydroelectric project under the jurisdiction of the Federal Power Commission. As far as we know, there are no existing and no plans to construct bulk power transmission lines, hydroelectric projects, or steam-electric plants in this area. However, any electrical transmission lines or natural gas pipelines in a construction area should be protected.

Very truly yours,
C. L. Fishburne
C. L. Fishburne
Regional Engineer

FEB 25 1975

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
COMMANDER (mep)
FIFTH COAST GUARD DISTRICT
FEDERAL BUILDING
431 CRAWFORD STREET
PORTSMOUTH, VIRGINIA 23705

5922
10 February 1975

Mr. David R. Hopkins
Chief, EIS Branch
Environmental Protection Agency
Room 208
1421 Peachtree Street, N.E.
Atlanta, Georgia 30309

Dear Mr. Hopkins:

The Fifth Coast Guard District has "no comment" to make concerning the draft EIS on Crabtree Creek, Wake County, North Carolina, EPA Project C370344. This proposed project is not expected to affect any area where the Coast Guard has jurisdiction by law or special expertise.

The opportunity to review this draft EIS is appreciated. Any future environmental impact statments should be forwarded to the attention of the Marine Environmental Protection Branch.

Sincerely,

FRANK J. DIERSEN
Commander, U. S. Coast Guard
Chief, Environmental Protection Branch
By direction of the Commander
Fifth Coast Guard District

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

APR 9 1975

In reply refer to:
EGS
ER-75/105

Dear Mr. Ravan:

This Department has received and reviewed the draft environmental statement for the interceptor sewer line, Crabtree Creek, Wake County, North Carolina (EPA Project C370344). We offer the following comments for your consideration.

Although potential adverse environmental impacts related to geologic conditions have been given adequate consideration in the draft environmental statement, we believe that the statement needs to more adequately evaluate the impact of encouraging upstream development on the already severe flood problem existing in the city of Raleigh. The area into which the sewer is to be built is in the headwaters of Crabtree Creek west of Raleigh. There is considerable development along the flood plain of the creek through the city and its suburbs, which now sustain significant damages during floods as frequent as those expected at intervals of five to 10 years. Assuming that the sewer will encourage urban development, we visualize that the flood problem will get considerably worse in Raleigh. The upstream flood-control reservoirs being built by the Soil Conservation Service are supposed to provide protection to Raleigh from the 100-year flood. However, if the upstream urban development produces the normal amount of sediment runoff, the protection offered by these reservoirs may be transitory. We suggest that this matter be considered in the environmental statement.

We commend the Environmental Protection Agency for the mitigative measures which will be taken to protect the recreational environment of the area immediately adjacent to the proposed project during construction. However, the draft environmental statement lacks sufficient detail and clarity with respect to several major recreational concerns.

Mr. Jack E. Ravan, Atlanta, Georgia

We are concerned about the proposed project's potential impact on the planned, partially funded, and partially implemented Raleigh Capital City Greenway Plan. In accordance with the current Nationwide Outdoor Recreation Plan, the Federal government will encourage the use of flood plains, wherever feasible, for park and recreation purposes. The draft statement notes on page ix that the Environmental Protection Agency will withdraw grant funds from the proposed project on January 1, 1976, "if land rights are not acquired for the proposed Soil Conservation Service structures or agreement on other measures to insure adequate flood protection is not reached." Although the statement describes the history and present status of the proposed SCS structures, and indicates that the adequacy of "other measures" to insure flood protection in the Lower Crabtree Creek Watershed will be determined by the State of North Carolina, the Soil Conservation Service, the Corps of Engineers, and the Environmental Protection Agency (p. 137), we believe the environmental impact statement is inadequate in explaining the relationships of Raleigh's Capital City Greenway Plan to the proposed project's "secondary," or indirect, impact on future flooding in the area downstream of the proposed sewerline, namely the Lower Crabtree Creek Watershed area. We have appended a brief description of the Capital City Greenway Plan and its present status.

We suggest that the environmental statement include information and a master conceptual plan map of the Greenway System as available from the city. We further suggest that the Greenway System information be considered in the determinations to provide grant funds for the proposed sewerline project contingent upon "adequate flood protection" on Crabtree Creek. Furthermore, it would seem that the current North Carolina State, Wake County, and Raleigh municipal flood-plain ordinances, together with Raleigh's participation in the emergency Federal flood insurance program, provide some measure of insurance against the increased "probability of damages from flooding in downstream areas" (p. ix). The flood-plain ordinances and insurance program bear a direct, beneficial relationship to the Greenway System plans. The environmental impact statement should also explain what effects the proposed project will have on the ordinances and insurance program if the SCS structures are installed.

From the information provided in the draft statement, it is unclear whether the proposed project right-of-way will require taking any land from the William B. Umstead State Park. From the sentence in the draft statement that "The 36-inch main serves the Upper Richland Creek Basin" (p. 8), we conclude that the 21-inch force main itself will bypass the park. However, the project will cut a 40-foot right-of-way (p. 87) and figures 7 and 17 show the proposed project will cross Umstead State Park.

Umstead State Park was, in part, developed with Land and Water Conservation Fund monies administered by the Bureau of Outdoor Recreation. If the right-of-way is required from the park, it is possible that Section 6(f) of the Land and Water Conservation Fund Act will apply. Under Section 6(f), such park land converted to another use requires prior approval by the Secretary of the Interior and, if conversion is approved, the land taken must be replaced by suitable lands of at least equivalent value. The impact statement should clarify if the proposed project will require taking of park land and, if such is anticipated, the statement should detail the impact of such taking on the existing recreation use of the park and on the planned expanded recreation use of the park as indicated by the current master plans for expanded recreational development at Umstead State Park.

We wish to note that the poor reproduction quality of figures 2 and 3 in the draft statement makes it impossible to adequately comment on the full potential impacts of the proposed project on planned recreational development in the area.

We also note that the suspended solids content in the effluent from the treatment plant is given as five parts per million on page 84 (last line), but as six parts per million on page 123 (three lines from bottom).

We thank you for the opportunity to review this environmental impact statement and hope that our comments will assist in the preparation of the final statement.

Sincerely yours,

Stanley D Doremus

Secretary of the Interior

Enclosure

Mr. Jack E. Ravan
Regional Administrator
Environmental Protection Agency
Region IV
1421 Peachtree Street, N. E.
Atlanta, Georgia 30309

Capital City Greenway Plan
Raleigh, North Carolina

Brief Description

The locally conceived and proposed Capital City Greenway System includes planned acquisition of the 100-year flood plain from Umstead State Park to the Neuse River. In its entirety, the Capital City Greenway System project basically proposes implementation of a metropolitan Raleigh "greenbelt" following the metropolitan area's flood plains. The Greenway System project proposes a "main stem" continuous greenbelt loop essentially following the Crabtree Creek and Walnut Creek flood plains. Greenway System "penetrators," following the numerous smaller urban tributaries to Crabtree Creek and Walnut Creek, will tie into the central greenbelt loop. The proposed Capital City Greenway Plan represents a nonstructural flood control method which has the potential to provide the following benefits: highly accessible outdoor recreation to a fast-growing metropolitan population, buffering of incompatible land-use zones, a humanly healthful and energy-conserving bicycle and pedestrian metropolitan transportation mode, maintenance of, or contribution to, clean urban air quality, reduction of certain toxicants in storm-water runoff water pollution, sociological neighborhood cohesion by linkage of community service facilities, and intangible aesthetic values associated with a natural environment.

According to the data of the Bureau of Outdoor Recreation, much of the 1,500-acre Crabtree Creek 100-year flood plain area is in a natural state. According to consultations with the Raleigh Recreation and Parks Department and with the Raleigh City Planning Department in February 1975, the Greenway System's status is as follows. Local funds in the amount of $350,000 are available for Greenway acquisition this year. These funds are expected to be used for full acquisition of the Lead Mine Creek Greenway penetrator on Crabtree Creek and of the Garner Branch Greenway penetrator on Walnut Creek this year. Local recreation funds of $200,000 are budgeted annually for additional Greenway acquisition in the next five fiscal years. The Raleigh Parks and Recreation Department and the citizens' Greenway Commission are supporting a vigorous program for Greenway flood-plain land donations. Approximately 75 to 100 acres of the Crabtree Creek flood plain are presently owned and developed for recreational purposes by the city of Raleigh.

In addition to locally budgeted municipal funds and private donations, sources of financial assistance to fully implement the entire Greenway System may include the following:

(1) The Land and Water Conservation Fund allocations.

(2) Contingency Reserve Funds from the Land and Water Conservation Fund.

(3) Special appropriation by the North Carolina State Legislature (this potential is under investigation by the city).

(4) Bicycle and pedestrian walkway grant funds per the Federal Aid Highway Act of 1973.

(5) Federal revenue sharing funds.

(6) Block grant funds per the Housing and Community Development Act of 1974.

(7) Federal grant funds for acquisition of the flood plain for flood control purposes per Section 73 of the Water Resources Development Act of 1974.

REGION IV
Peachtree—Seventh Building
50 Seventh Street, N.E.
Atlanta, Georgia 30323

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
GREENSBORO AREA OFFICE
2309 WEST CONE BOULEVARD
NORTHWEST PLAZA
GREENSBORO, NORTH CAROLINA 27408

February 12, 1975

IN REPLY REFER TO:
4.4S

Mr. Jack E. Ravan
Regional Administrator
Environmental Protection Agency
1421 Peachtree Street, N. E.
Atlanta, Georgia 30309

Dear Mr. Ravan:

Subject: Draft Environmental Impact Statement
EPA Project C370344
Wake County, N.C.

Thank you for the opportunity of reviewing the proposal.

We have no substantative comments to make at this time.

Sincerely,

James R. Rhodes

R. B. Barnwell
Area Director

cc:
Mr. Leo Zuber

[illegible]

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
Region Four
Post Office Box 26806
Raleigh, North Carolina 27611

March 28, 1975

In reply refer to:
04-37.3

Mr. David R. Hopkins
Chief, EIS Branch
Environmental Protection Agency
Room 208 - 1421 Peachtree Street, N. E.
Atlanta, Georgia 30309

Dear Mr. Hopkins:

Subject: Draft Environmental Impact Statement, Crabtree Creek, Wake County, North Carolina.

We have reviewed the Draft EIS in terms of existing and future planned highways. Except for the normal problems associated with sewer line construction along and across highways, there are no apparent conflicts associated with this proposal.

It appears, however, that the majority of the information concerning transportation in Section IV. B. 4. "Community Services and Utilities" was ommitted. In this section, p. 113 ends in a discussion of storm water runoff, and p. 114 begins in the middle of a sentence dealing with highways. The Final EIS should include the missing information.

Sincerely yours,

T. J. Morawski

T. J. Morawski
Division Engineer

cc:
Chief, Environmental Dev. Div.,
Wash., D. C. (HEV-10) (1)
Council on Environmental Quality,
Wash., D. C. (5)
Office of Environmental Affairs,
US DOT, Wash., D. C. (TES-70) (1)
Federal Highway Administration,
Atlanta, Georgia 04-00.7 (2)

STATE OF NORTH CAROLINA
Department of Cultural Resources
Raleigh 27611

James E. Holshouser, Jr.
Governor

Grace J. Rohrer
Secretary

Division of Archives and History
Robert E. Stipe, Director

February 11, 1975

Mr. Jack E. Ravan
US EPA
1421 Peachtree St., NE
Atlanta, GA 30309

Dear Sir:

As stated on page 227 of the Draft Environmental Impact Statement on Crabtree Creek, Wake County, North Carolina, this office would like to have an archaeological survey of the area prior to any construction. We are requesting this survey because archaeological sites are known from the vicinity and because they are found in the same ecological situations which will be impacted by the sewer.

Until such time as this survey is performed by a competent, professional archaeologist, this office would have to comment adversely upon the project.

Sincerely,

Robert E. Stipe

cc: Ms. Catherine Cockshutt
Dr. Stephen J. Gluckman

[illegible] STATEMENTS
[illegible]
REGION IV, ATLANTA, GA

State of North Carolina
Department of Agriculture
Raleigh

JAMES A GRAHAM
COMMISSIONER

April 3, 1975

Mr. David Hopkins, Chief
EIS Branch
Environmental Protection Agency
Room 208-1421 Peachtree Street, NE
Atlanta, Georgia 30309

Dear Mr. Hopkins:

As Commissioner of Agriculture of North Carolina, my department is charged with the responsibility of operating the North Carolina State Fair. The State Fair property is in the Richland Creek Watershed of Wake County. It is my understanding that you held a hearing in Raleigh on March 13, 1975 concerning the extension of the existing Crabtree Sewer Outfall up Richland Creek. I would like to go on record as favoring the extension of this sewer line. Currently a part of the sewage from the North Carolina State Fair is being pumped over a hill into the Walnut Creek drainage area and currently we are going to spend several hundred thousand dollars for an additional pumping station which will enable us to better utilize the State Fair property. However, the pumping station will not meet our needs indefinitely.

In endorsing the extension of the sewer line up Richland Creek, I would like to say to the EPA that this action on the part of Wake County will be very beneficial to the State of North Carolina insofar as the State Fairgrounds are concerned. As you no doubt know, we have many people to congregate at the fairgrounds during fair week and we have to make temporary provisions at this time in some of the areas of the fairgrounds for sanitary sewage disposal. Even though we take the necessary precautions, we recognize this as a potential health hazard which could be cured by the extension of the Richland Creek sewer outfall.

Very truly yours,

Jim Graham

James A. Graham
Commissioner

JAG:ji

Wake County
Department of Natural Resources

Room 612 — Wake County Courthouse • P. O. Box 1226 • Raleigh, North Carolina 27602

H. A. "JACK" SMITH
DIRECTOR

Telephone (919) 755-6[illegible]38

April 4, 1975

Mr. David R. Hopkins, Chief
EIS Branch
Environmental Protection Agency
1421 Peachtree Street, N. E.
Room 208
Atlanta, Georgia 30309

Re: Rex Gary Schmidt letter of March 27,
1975 relating to EPDA Project C
370334 Crabtree Creek Sewer Outfall

Dear Mr. Hopkins:

Mr. Rex Gary Schmidt of Raleigh, North Carolina was kind enough to share with me a copy of his letter to you concerning EPA Project C 370334 in which he raised several questions concerning structure #11 of the Crabtree Creek Watershed project.

Mr. Schmidt is correct in that structure #11 has been relocated to a new site different from that shown on the map used in the Environmental Impact Statement. The new location was selected sometime ago and was done to provide additional storage volume and to provide the best possible utilization of all resources in the area while at the same time providing the needed degree of flood control.

It is also true as Mr. Schmidt indicated that Wake County at one point proposed to close the bridge over Reedy Creek Road (State Road 1775). Mr. Schmidt, Dr. Walton, operators of the North Carolina State University Agricultural Farm and other residents did raise objections to this proposed closing. As a result, we have entered into negotations with the Division of Highways of the North Carolina Department of Transportation to develop plans for elevating the bridge and keeping the road open. Construction of a new bridge to keep Reedy Creek Road open over Richland Creek will, of course, be an expense to Wake County; an expense that we feel is justified due to the objections and the apparent inconvenience that would be caused to residents in the area.

We trust that our actions in keeping the road open will mitigate the objections raised by Mr. Schmidt and alleviate his suggestion that there be a delay in granting of funds for the sewer outfall extension.

I wholeheartly concur with Mr. Schmidt that the individual tax payers hopes and aspirations are indeed worthy of consideration in any public undertaking. The Wake County Department of Natural Resources attempts at all times to fully consider points raised by citizens in developing the watershed project.

Should you need any further information pertaining to the plans for structure #11, we will be pleased to provide them to you or to ask the Soil Conservation Service to provide the information which they have developed that would assist you in evaluating the project.

Sincerely yours,

H. A. Smith

H. A. Smith

HS/dc

cc: Mr. Vassar Shearon
Chairman, Wake County Commissioners

Mr. Stewart Adcock
Chairman, Wake Soil and Water Conservation District

Mr. C. S. Sawyer, District Conservationist
Soil Conservation Service

Dr. Russell Walton
Mr. Ernest Stone
Mrs. Ora Lee Jones
Mr. Marvin Moss
Mr. Bill Dunn
Dr. James A. Valone
Mr. Garland H. Jones
Mr. James H. Mills
Mr. Rex Gary Schmidt

WAKE
Soil and Water Conservation District

OUR SOIL ★ OUR STRENGTH

P. O. Box 1226 • Raleigh, N. C. 27602
Telephone (919) 755-6134

February 25, 1975

Mr. David R. Hopkins
Chief, EIS Branch
Environmental Protection Agency
Room 208, 1421 Peachtree Street, N.E.
Atlanta, Georgia 30309

Re: Draft Environmental Impact
Statement, Crabtree Creek
Wake County, North Carolina
EPA Project C370344

Dear Mr. Hopkins:

We have reviewed the subject impact statement and would suggest that two statements, both appearing on page 55, be corrected.

On page 55, in the first paragraph, the statement is made "to implement the plan, the Wake Soil and Water Conservation District was formed." Wake County has been part of a soil and water conservation district since 1939. Initially part of the four county Neuse River district, the Wake Soil and Water Conservation District was chartered as a single county district in 1965.

The soil and water conservation district has been and continues to be a sponsor of the Crabtree Creek Watershed Project. However, we believe your reference is actually to the Wake County Watershed Improvement Commission.

We would suggest that the first sentence of the first paragraph on page 55 should read:

"To implement the plan, the Wake County Watershed Commission was formed".

To be correct as of this date, the second sentence in the second paragraph of page 55 should read as follows:

"Three structures, Nos. 2, 3, and 18 have been completed; three additional structures, Nos. 13, 22, and 1 are under construction and should be completed by the end of 1975."

We will appreciate your consideration of these corrections and changes.

Sincerely,

Stewart Adcock

Stewart Adcock
Chairman

SA/dc

TRIANGLE J COUNCIL OF GOVERNMENTS
100 PARK DRIVE P.O. BOX 12276 RESEARCH TRIANGLE PARK, N.C. 27709 (919) 549-8302

March 28, 1975

RECEIVED
APR 01 1975

Mr. David R. Hopkins
Chief, EIS Branch
Environmental Protection Agency
Room 208-1421, Peachtree Street, N.E.
Atlanta, Georgia 30309

Dear Mr. Hopkins:

RE: EPA C370 344

The Triangle J Council of Governments has reviewed the Draft Environmental Impact Statement for the construction of an interceptor sewer line in Wake County, North Carolina, to service the upper drainage basin of Crabtree Creek. The Triangle J Council of Governments, as the Council of Governments for the area of concern as well as the 208 agency for the area of concern, has the following comments relative to that Draft Environmental Impact Statement.

1. TJCOG recommends that the subject project be funded as requested by Wake County. The area to be served is one that holds promise of considerable development in the next several decades. The area will come under the urbanizing influence of Raleigh, Cary, and the Research Triangle Park. Since soils in the basin are not suitable for development for septic tanks or on-site water supplies, adequate wastewater collection and transmission lines must be provided.

2. The lower Crabtree Creek watershed must be protected from flooding at all reasonable costs. This area is already heavily developed and subject to flooding at present. The projection for significant increases in urbanized areas in the upper watershed indicates that significantly greater amounts of stormwater will be released to the streams after development of the area. Existing and proposed Soil Conservation Service structures are projected to mitigate this problem, and assurances of this projection should be received.

3. Construction grant funds should not be withdrawn from the project on January 1, 1976, if all land rights for the proposed SCS structures are not acquired by that date. Work should proceed on

APEX • BENSON • BROADWAY • CARRBORO • CARY • CHAPEL HILL
CLAYTON • DURHAM • FOUR OAKS • FUQUAY-VARINA • GARNER
GOLDSTON • HILLSBOROUGH • HOLLY SPRINGS • KENLY • KNIGHTDALE
MICRO • MORRISVILLE • PINE LEVEL • PITTSBORO • PRINCETON
RALEIGH • ROLESVILLE • SANFORD • SELMA • SILER CITY
SMITHFIELD • WAKE FOREST • WENDELL • ZEBULON
CHATHAM COUNTY • DURHAM COUNTY • JOHNSTON COUNTY
LEE COUNTY • ORANGE COUNTY • WAKE COUNTY

acquiring these land rights and so long as progress is being made, EPA grant funds should remain available to Wake County.

4. The 208 Agency (TJCOG) in conjunction with the local governmental bodies, plan to address the effects of urbanization and changing land use on water quality. By the time the project is funded and development of the area begins, we hope to be better able to make wise judgments to allow the water quality of Crabtree Creek to be maintained and enhanced.

We appreciate the opportunity to make these comments relative to the subject project.

Sincerely,

Thomas W Bradshaw Jr

Thomas W. Bradshaw, Jr.
Chairman

TWBjr:ns

cc: Vassar Shearon
Garland Jones
Clearinghouse & Information Center ✓
James Mshar

THE UNIVERSITY OF NORTH CAROLINA
WATER RESOURCES RESEARCH INSTITUTE

Office of the Director
124 Riddick Building
North Carolina State University
Raleigh, North Carolina, 27607
Telephone: 919:737-2815

March 13, 1975

Mr. David R. Hopkins
Chief, EIS Branch
Environmental Protection Agency
Room 208 - 1421 Peachtree Street, N.E.
Atlanta, Georgia 30309

Dear Mr. Hopkins:

You are to be congratulated on the quality of the Draft Environmental Impact Statement for Crabtree Creek in Wake County, North Carolina. The following comments are submitted for your consideration:

1. An understanding of flood probabilities and damages under varying conditions of development and SCS structures would be more complete if the assumptions and methodology utilized in calculations were made available. The lack of reliable data makes one very uncomfortable with estimates which must be taken at face value.
2. Your estimates of pollution from urban land runoff might be made more site specific by reference to data from the Durham studies.*
3. Some of the text has been omitted in moving from page 112 to page 113. It appears that page 114 should follow page 112 - but there is a break in text from page 113 to page 115.
4. While I have no personal experience with aeration of sewage for odor control, I would question whether this could be done effectively within the limited space available in pumping stations. Even so, exhaust venting would itself become a source of offensive odors. Would chlorination not be more effective?
5. Use of the interceptor sewer right of way for greenway and recreation should be planned concurrently by local government.
6. On page 137, the alternative to acquisition of land rights for SCS structures appears to be unnecessary. Why should there be an alternative? The structures are needed and the land must be acquired. The "or until other measures are taken, ----" offers a way out of what should be a commitment.

*WRRI-UNC Report No. 37, "Quality of Stormwater Drainage From Urban Land Areas in North Carolina," by E. Bryan, copy available on request.

EPA Report, "Characterization and Treatment of Urban Land Runoff," by N. V. Colston, Jr., Project 11030 HJP (in press - draft copy available at the Institute).

THE UNIVERSITY OF NORTH CAROLINA *is comprised of the sixteen public senior institutions in North Carolina*

7. The Jan. 1, 1976, deadline for land rights may be too restrictive.

I hope that these remarks will be useful in the preparation of the final environmental impact statement.

Sincerely yours,

David H. Howells

David H. Howells
Director

DHH:em

City Of Raleigh
North Carolina

March 14, 1975

Mr. David R. Hopkins
Chief - EIS Branch
Environmental Protection Agency
Room 208 - 1421 Peachtree Street, N. E.
Atlanta, Georgia 30309

Dear Mr. Hopkins:

Subject: Comments - Draft Environmental Impact Statement on Crabtree Creek, Wake County, North Carolina, EPA Project C370344

Attached you will find the Raleigh's City Council position concerning the above subject.

The public hearing was held on Thursday, March 13, 1975, in the State Highway Building, Raleigh, N. C.

Sincerely yours,

L. P. Zachary, Jr.
City Manager

LPZjr:pw

Attachment

CC: Mayor
City Clerk
City Attorney
Director of Public Utilities

OFFICES · 110 SOUTH McDOWELL STREET · POST OFFICE BOX 590 · RALEIGH, NORTH CAROLINA 27602

City Of Raleigh
North Carolina

March 13, 1975

Raleigh City Council Position Concerning the Crabtree Creek Interceptor Sewer Line, and Draft Environmental Impact Statement. EPA Project C370344

The City Council of the City of Raleigh, North Carolina supports the construction of the Crabtree Creek interceptor sewer line provided this sewer service extension is performed in accordance with the City Council resolution adopted on February 7, 1974 concerning extension of water and sewer services into Wake County. (This resolution is reproduced on page 224 of the EIS.)

The City Council recognizes the need for adequate flood control for the City of Raleigh and to that end strongly supports an on-going program by Wake County, the Soil Conservation Service, and other involved agencies to complete all the planned flood control structures in Wake County.

The City Council therefore takes the position that the City will permit sewer service to developing areas in watersheds upstream of flood control structures which are in place or under contract to be constructed.

However, the City Council reserves the right not to continue to allow any connections to the interceptor sewer line if, in its opinion, Wake County, the Soil Conservation Service, and other involved agencies are not maintaining a reasonable, on-going program of land acquisition and construction of all the remaining necessary flood control structures. The City Council feels this policy is needed as the installation of all the planned flood control structures are necessary to provide areas in Raleigh adjoining Crabtree Creek with flood protection. Development upstream from Raleigh, which will be encouraged by the sewer line extension, will cause increased flooding in Raleigh unless all of the flood structures are installed.

The City Council feels that the Environmental Impact Statement should reflect this position.

In addition, the City Council recommends that the following comments and corrections be incorporated into the Environmental Impact Statement.

OFFICES · 110 SOUTH McDOWELL STREET · POST OFFICE BOX 590 · RALEIGH, NORTH CAROLINA 27602

Page No.	Comment
6	If this project is not constructed the paralleling of existing 30" Interceptor west of Blue Ridge Road and Highway 70 will not be required.
38	The Walnut Creek wastewater plant effluent has been relocated to SR 2551 and is greatly improved; it is not causing considerable water quality degradation.
40	The Southside water plant is rated at 13 MGD and its sources of supply are Lakes Raleigh, Johnson, Benson, and Wheeler. The Southside plant will be used continuously, not as a standby facility. The City contract with U. S. Corps Engineers is for a maximum of 100-MGD supply from Falls Reservoir. The City has no plans to withdraw any water from New Hope Reservoir.
44	The Beaver Dam Creek Reservoir is a City of Raleigh project. Contract awards were made by Raleigh in October, 1973 and is financed by the City and a grant from State of North Carolina.
69	The request for change of the interceptor location was made by the State of North Carolina and National Park Service.
88	The City of Raleigh objects to the vents above 100 year flood unless they are installed underground and vent above the contour elevation of the 100 year flood.
89	If proper aeration at the pump station is provided, there should be no odor problems.
112 & 113	Pages are out of sequence.
117	Additional recreational facilities will be available at the proposed Falls Reservoir.
124-125	The minimum natural buffer of 10 meters (33 feet) is adequate but should not be reduced. The boundaries of the buffer should be marked and the contractor required to stay out of the buffer.
124-128	Erosion control measures suggested in the EIS are excellent and should be part of the erosion control plan.

128	An erosion control plan is required for the project and will be submitted to the State.
133-135	The vegetative survey proposal is excellent and should help make the project acceptable to environmental groups.
221 & 223	Labeled incorrectly or is out of sequence.

L. P. Zachary, Jr.
City Manager

pb/Th885-634

LEAGUE OF WOMEN VOTERS

OF RALEIGH-WAKE COUNTY
617 Macon Place
Raleigh, North Carolina 27609
March 14, 1975

TESTAMONY ON THE EPA ENVIRONMENTAL IMPACT STATEMENT ON THE CRABTREE WATERSHED

First the League of Women Voters would like to complement EPA on the care with which the environmental impact statement was prepared. Except for one item, the problem of odor (mentioned on pages 89 and 129), we feel that the statement adequately discusses possible adverse impacts on the areas through which the sewer line will actually be built. The detrimental effects of odor problems on established neighborhoods are great enough so that adequate procedures to prevent the problem before it occurs should be established.

Most of our comments tonight are prompted by a concern for those living downstream from the area to be serviced by the sewer line. On page X of the environmental impact statement it says that "Grant funds shall be withdrawn January 1, 1976 from the proposed project if land rights are not acquired for the soil conservation service structures or agreement on other measures to insure adequate flood protection is not reached." The word "or" in the statement seems to make requiring the land rights optional. We would recommend that "and" be substituted so that there would be no confusion about the requirement.

The major obstacle to acquiring the land rights is that the increased development potential of the area has led to a sharp rise in land prices. This puts the public in the position of subsidizing private development in this area twice. First, it pays for the extension of the sewer line and secondly, it then must pay high prices to protect itself (in terms of flood prevention structure) from the development that the sewer encouraged. It seems to us that there should be some procedure requiring either outright donation or at least a way to acquire the land for the dams at some reasonable price not dependent on inflated development potential. People who have been waiting many years for construction of the dams would feel much more confident if the county were also required to have a schedule which would insure that the dams could be completed before the sewer was built.

The final point to be realized is that even construction of the eleven dams remaining in the project will not wholly protect Raleigh citizens downstream from flooding if the area is rapidly and completely developed or if the development itself is allowed to cause sedimentation and runoff problems. Because of this we recommend that the county prepare a schedule for land use planning and zoning in this area. This plan could also time development so that available resources (such as our water supply) would not be threatened by a too rapid growth in demand.

We thank you for this opportunity to testify.

OAK PARK - GLEN FOREST - DEBLYN PARK

Civic Association

Raleigh, N. C. 27612

March 11, 1975

Ref: EPA Project C370344
Crabtree Creek, Wake County,
North Carolina

Mr. David R. Hopkins
Chief, EIS Branch
Environmental Protection Agency
Room 208 - 1421 Peachtree St., N.E.
Atlanta, Georgia 30309

Dear Mr. Hopkins:

Our Association of more than 600 members wishes to go on record with regard to this Project. First, we do recognize that EPA has done a commendable and responsible job in the development of the EIS draft, especially when one reflects on the county's land plan. Second, our Association in no way wishes to deliberately interfere with or stop the logical development of the Crabtree Creek drain basin. Third, our expressed concerns regarding this Project are the result of deliberate and constructive discussions with our counterparts in the community and with professional engineers and scientists in our Association.

We wish to comment as follows:

1. We endorse as logical, responsive and representative of our position, the statement by Mr. Robert E. Giles, Chairman, Northwest Community Task Force, as released at the Raleigh, N. C., hearing on 13 March 1975. We request serious consideration of the concerns expressed.

2. Reference page 153 of the EIS which states: "Development of the upper watershed must not be allowed at the expense of further endangering property and lives in downstream areas." We fully endorse this EPA position and urge that the Final Environment Impact Statement (FEIS) make every assurance that this stated objective is met.

3. We take the position that: "Assurance" that the stated position and objectives of this Project are met can only be assured if all required schedule events and actions are formalized within the Project's writeup. This we feel is essential to provide adequate confidence that the Project will be successfully completed as originally planned.

4. To insure that the Project is completed as noted above, we recommend that the definitized plan include a stated set of conditions or technical specifications as an appendix to the FEIS. This would include a summary statement of the bases or reasons for each specification. Included also in the specifications would be provisions which would insure that future necessary changes to the specification and plans be processed and evaluated in the same manner as were the original. These specifications would be a part of the FEIS and would be binding to the participants in the Project.

5. We do not believe the impact of the future Raleigh-Durham airport development has been shown in sufficient depth with regard to increased surface drainage from that area.

We thank you for the opportunity to present our concerns and support of your Project. We will be following up with additional inputs after the 13 March hearing in Raleigh.

Regards,

J. R. Bohannon, Jr.
Chairman, Streets & Environment

JRBjr:gw

cc: Std. Distribution
Mr. Giles
EPA Headquarters
C. Commissioners

SIERRA CLUB ☧ Joseph LeConte Chapter
. . . To explore, enjoy and preserve the nation's forests, waters, wildlife and wilderness . . .

March 26, 1975

Mr. David R. Hopkins, Chief
EIS Branch
Environmental Protection Agency
1421 Peachtree Street, N. E.
Atlanta, Georgia 30309

IN RE: Draft Environmental Impact Statement, Crabtree Creek, Wake County, North Carolina EPA Project C370344

Alternative Routing to the Walnut Creek Interceptor (pp. 75-76)

Dear Mr. Hopkins:

We feel that the Northwest Community Task Force has raised some valid questions in the attached supplemental statement submitted by Mr. Robert E. Giles. We would appreciate your further study and cost analysis of the alternative routing to the Walnut Creek interceptor. Specifically, is there a major cost difference in the proposed pumping station at Richland Creek and a pumping station to Walnut Creek? Also, what would be the difference in the cost of annual maintenance and operation of the pumping station rather than using gravity flow? What areas of the upper watershed would be without sewer service if the Walnut Creek route were used? Would use of the Walnut Creek line avoid the necessity for a parallel line from Oak Park to the Crabtree Mall area? Looking at Figure 17, we cannot see any developable area between the Oak Park section and the Richland Creek pumping station. This is another reason we recommend your further study and analysis of the possibility of using the Walnut Creek alternative routing for the final Environmental Impact Statement.

Thank you very much for such a thorough draft EIS, and for your consideration of our questions concerning the use of the Walnut Creek alternate route.

Sincerely yours,

Anne Taylor

Anne Taylor, Chairman
North Carolina Conservation Committee, Sierra Club

Joyce Anderson

Joyce Anderson, Acting President
Wake Environment

Martha M. Gardner

Martha M. Gardner
Crabtree Creek Citizens' Assistance Committee

~~cc: Mr. Robert Giles~~

Anne Taylor, North Carolina
  Conservation Chairman, Sierra Club
4217 Laurel Ridge Drive
Raleigh, North Carolina 27612

Joyce Anderson, Acting President
Wake Environment
P. O. Box 5524
Raleigh, North Carolina 27607

Martha M. Gardner
Crabtree Creek Citizens' Assistance Committee
4206 Azalea Drive
Raleigh, North Carolina 27612

4206 Azalea Drive
Raleigh, North Carolina 27612
March 26, 1975

Mr. David R. Hopkins
Chief, EIS Branch
Environmental Protection Agency
Room 208 - 1421 Peachtree Street, N.E.
Atlanta, Georgia 30309

Dear Mr. Hopkins:

In reading the draft environmental impact statement for the Crabtree Creek, Wake County, North Carolina EPA Project C370344, I cannot find specific reference made to the inclusion of a vegetative survey which includes plants other than trees. On pages 129-134, criteria and plans for preserving the vegetation are outlined, and I was especially pleased to read that it is felt that the ecotonal vegetation in much of the project area meets the criteria listed on page 130. However, to ensure that endangered or threatened (see definitions on page 93 of enclosed copy of article "One-tenth of Our Plant Species May Not Survive" from the January 1975 SMITHSONIAN magazine) plants along the project area are located and inventoried, I strongly recommend that a survey of plants other than woody vegetation be made.

I live in the upper Crabtree Creek watershed and am familiar with portions of the area the sewer line will traverse in which endangered and/or threatened plant species are located. I am enclosing a copy of the letter I wrote to the Coastal Zone Resources Corporation in which I listed a few of these plants. The enclosed copies of articles or portions of articles from the January 1975 SMITHSONIAN magazine give in detail the reasons for preserving plant species in their natural habitat; in short, not enough is now known about the potential of these plants for possible future food, medicine, and insecticide/pesticide sources to allow them to be lost to us. As the article "One-tenth of Our Plant Species May Not Survive" referred to above states "Imagine the loss to mankind if we had destroyed the cinchona before discovering quinine's antimalarial qualities," page 94.

Now that the "Report on Endangered and Threatened Plant Species of the United States" mandated by the Endangered Species Act of 1973 has recently been completed by the Smithsonian Institution and submitted to Congress (see enclosed copy of the Sierra Club National News Report, Volume 7, Number 10, March 21, 1975 "Around the Nation"), I feel it is imperative that a non-woody vegetative plant survey be made of the EPA Project C370344. Could you tell me if such a survey is planned, and when? Are citizens allowed to go along? If so, I would like to accompany the botanists. As you know, the time of year the survey is made is important, because the foliage of some of these plants disappears completely in the summer and/or fall. If this survey is made, will it be included in the final EPA environmental impact statement for this project?

Thank you very much for a generally excellent draft EIS on this project.

Sincerely yours,

Martha M. Gardner

Martha M. Gardner
(Mrs. Robin P. Gardner)
Crabtree Creek Citizens' Assistance Committee

Enclosures

ROBERT E. GILES
4216 OAK PARK ROAD
RALEIGH, N. C. 27612

March 25, 1975

Mr. David R. Hopkins, Chief
EIS Branch
Environmental Protection Agency
1421 Peachtree Street, N.E.
Atlanta, Georgia 30309

Dear Mr. Hopkins:

I wish to supplement my remaks at the public hearing of March 13 on the Crabtree Creek sewer line project, and ask that the attachment be included in the record and be given full consideration in your preparation of the Final Environmental Impact Statement.

In particular, I call your attention to the observations and recommendations concerning the alternative routing to the Walnut Creek interceptor (pp. 75-76 of the Draft EIS).

The recommended wording appearing on page 9 of my statement of March 13, already filed with EPA, would of course be applicable to EPA participation in a revised project which eliminates that segment of the interceptor line between Oak Park and Umstead State Park.

Our recommendation with respect to the alternative routing to the Walnut Creek interceptor was arrived at only after further intensive study and consideration of the Draft EIS, and consideration of the best available information.

If you have any question regarding this supplemental statement of views, I would be pleased to hear from you.

I wish again to express my appreciation to EPA for the fine work reflected in the Draft EIS, for the conduct of the public hearing on March 13, and for your further efforts in connection with this matter.

Sincerely,

Robert E. Giles

Robert E. Giles

attachment

SUPPLEMENTARY STATEMENT BY ROBERT E. GILES
on
THE DRAFT ENVIRONMENTAL IMPACT STATEMENT, CRABTREE CREEK SEWER LINE PROJECT

Pages 63-65 of Draft EIS -- Discussion of the Wake County "Plan of Action" which is set out in Appendix 7.

> The Final EIS should contain an up-to-date report on the progress of the County (as of April 1, 1975) in accomplishing the things called for in the County Plan of Action, compared with the schedule of activity specified for the County in that Plan.

Page 88 of Draft EIS -- Discussion of the width of the right-of-way and a recognition that a width of 10 meters or less is possible and should attempted in existing residential and other particularly aesthetic areas.

> The Final EIS should make this a mandatory requirement rather than a passing exhortatory observation.

Page 88 of Draft EIS -- Discussion on use of a "vent" in lieu of the unsightly high man holes.

> The Final EIS should provide that the vents will extend underground from their connection with the sewer line, so as to emerge and rise above ground at the right-of-way edge nearest the creek. This would seem to be a simple and feasible measure which would reduce the visual distraction which would result if the vents (presumably small diameter pipe) rose several feet in the air in the middle of the right-of-way area.

Pages 80 and 129 of Draft EIS -- Discussion of steps to eliminate odors.

> The Final EIS should contain language to require measures which would assure that there would indeed be no discernible odors, especially where the line might run through developed areas.

Pages 75-86 of Draft EIS -- Discussion on the alternative routing to the existing Walnut Creek interceptor.

> The Draft EIS acknowledges that by expanding the lift capability of the pumping station which is to be built west of Umstead State Park, the wastewater from the upper basin could be pumped along Reedy Creek Road to the Walnut Creek interceptor and thence to the Neuse River treatment plant.
>
> We take strong exception to the analysis and conclusions then stated in the Draft EIS regarding this alternative.

First, there is no explanation or justification as to why the Richland Creek and Turkey Creek areas must have a connection with the existing Crabtree Creek interceptor. Why, indeed, should they?

Is not the answer clear, to accommodate future development in those areas? And this, on the face of matters, is an inadequate justification when the total circumstances are properly considered.

The specific question should be put this way: why install that segment of a major interceptor sewer line from the Oak Park area to the pumping station which is to be built west of Umstead State Park? What is there in that particular area that compels and genuinely justifies the installation of this huge interceptor line?

Is it not true that if State agencies need additional capacity for the State Fairgrounds area, the existing line and pumping capacity to send the wastewater to the Walnut Creek interceptor, from that area, can be improved?

Is it not true that without the proposed 48" line connecting at Oak Park, the segment of the existing 30" line from Oak Park to Crabtree Valley Mall and further downstream would not have to be paralleled? That the justification for paralleling the existing Crabtree Creek interceptor applies only to a segment of that interceptor well below the Oak Park area, a situation that is completely unrelated to the proposed 48-inch interceptor line?

We strongly urge that your Final Impact Statement should, with respect to this alternative, analyze and respond to the following points:

(1) How much savings would be effected by eliminating the future necessity of running a parallel line to the existing Crabtree Creek interceptor all the way up to the present Oak Park termination?

(2) How much savings in money would be effected, and the primary and secondary adverse impacts eliminated, by cutting out the several-mile segment of the proposed interceptor which would run from Oak Park to the pumping station west of Umstead State Park?

(3) How much additional cost to expand the lift capacity of the pumping station west of Umstead Park so that the wastewater from the upper basin could be pumped along Reedy Creek Road to the Walnut Creek interceptor?

(4) How much additional cost to improve existing line and pumping capacity to send the wastewater from the State Fairgrounds area to the Walnut Creek interceptor?

We strongly urge that your Final Impact Statement should, following a careful analysis of all the relevant factors and giving appropriate consideration to all the environmental factors, reach the following conclusion in lieu of that set out in the last paragraph on page 76:

> "This alternative, therefore, is indeed reasonable. It would: (1) avoid a parallel line to the existing Crabtree Creek interceptor for a significant distance from the Oak Park area to a point downstream; (2) avoid the tremendous expense of installing several miles of sewer line from Oak Park area to Umstead State Park; (3) avoid the significant primary adverse impacts of installing several miles of sewer line from the Oak Park area to Umstead State Park; (4) while eventually requiring a parallel line to the existing Walnut Creek interceptor (by about 1995) this expense would have to be incurred in any event by the year 2020 or earlier.
>
> "Therefore, the project should be revised to eliminate the extension of an interceptor line from the Oak Park area to the pumping station west of Umstead State Park in order to qualify for Federal financial participation."

RUSSELL C. WALTON, JR., D. D. S.
2001 CLARK AVENUE
RALEIGH, NORTH CAROLINA 27605

TELEPHONE 834-5157

March 21, 1975

Mr. David R. Hopkins
Chief, EIS Branch
Environmental Protection Agency
Room 208 - 1421 Peachtree Street, N. E.
Atlanta, Georgia 30309

Dear Sir:

I regret that I was unable to stay past the intermission at the public hearing held at Raleigh, North Carolina on March 13, 1975 in order that I may speak my opinion concerning EPA Project C370334, Crabtree Creek sewer outfall extension. I call your attention specifically to the error of Mr. Jack Smith of the Wake Soil and Water Conservation District who presented his part swiftly and ambiguously.

I call to your attention specifically to page 56, table 6, and the accompanying project map Crabtree Creek watershed and refer to Structure #11. I ask you to take note of this structure as given in table 6 and on the map as it is 100% wrong.

I have been informed that this structure has now been moved as of the last thirty days to a position near the park boundary of Umstead Park. This involves about 35 acres of my farm, and results in the closing of Reedy Creek road 1650 as shown on the map, to accomodate a sixteen acre ~~pump~~ Permanent pool which would all but cover the bridge.

Reedy Creek Road is the primary road to and from our place of employment for those of us that live along roads #1650 and #1655. Considerable traffic along this road consists of slow moving, heavy farm machinery which is incompatible with traffic moving along the only other longer alternate route, as we will now be on a dead end road. I have asked to see a traffic study, but naturally received only mumbo jumbo. The closure of the road will result in undue hardship for the people of our area, and certainly this should be considered at this time. I have called this to the attention of each county commissioner, but I get only ambiguous answers and referrals, or no response at all.

I can assure you that flooding is one thing, but to have your high and dry lands purposely flooded is another intolerable thing. To have your farm and life's work taken to protect others life work is also just as undesirable from my point of view. I feel that the change of structure #11 without a public hearing as to the effects of closing of road #1650 and dead ending of #1655, and the flooding of my pastures, certainly involves more planning than has been given.

This plan unknowingly involves a very old graveyard that has an undetermined number of graves that must be disturbed to construct the dam and overflow as planned. The cost or feasibility of this factor was never considered. Also, I have yet to see any traffic study published as to the effects of closing of route #1650.

RUSSELL C. WALTON, JR., D. D. S.
2001 CLARK AVENUE
RALEIGH, NORTH CAROLINA 27605
TELEPHONE 834-5157

I urge you to delay any granting of funds until at least this error of structure #11 has been considered seriously, and the matter resolved rather than accept a casual "We will take care of that later." I feel that the deadline established has placed a state of panic among those few who are to receive tremendous benefits from the project, and all they can think about is to push it on through.

Certainly all responsible citizens are interested in orderly development, especially when it comes to long term water and sewer development for the county. I can assure you that pumping for eternity would be much more costly than to run the sewer along the creek right through the park. As you know, Umstead is a natural area only about Forty years old. To pump over the hill for years to come will cost more than the whole park to begin with.

A very close friend of mine, Mr. John C. Anderson, Wake Farm Agent, was one of the most instrumental persons in selecting the location of the park. The park was located there because the land was absolutely worthless for anything else but a park. It has about thirty-five to forty years growth on it since its establishment. Structure #25 will change drastically the nature of the creek and its surrounding low grounds even more so than the establishment of a sewer right of way. After all, #25 will ruin the natural creek for sure.

RUSSELL C. WALTON, JR., D. D. S.
2001 CLARK AVENUE
RALEIGH, NORTH CAROLINA 27608
TELEPHONE 834-9157

As for all the chabter to establish Greenways along the sewer right of way, is only to invite vandals and hippies who make Umstead Park a doubtful place now to take your family. I live adjacent to the park and it is shocking to see what goes on. On a warm summer afternoon the park wardens are busy just keeping lovers off the tops of the tables, much less policing the area. I can't keep them out of my pasture either. If my bull had the same ideas of some of the present generation, he'd be worn out before the cows come in season.

It's easy for these conservation club members to advocate these greenways and beautiful idealistic parks along a right of way, but it's hard to understand how they would be safe to be near us as one can hardly walk down main street without fear of getting slugged for his pocket change.

I feel that this whole project has had a number of idealistic factors tacked to it to accomplish some things that require long and serious thinking and consideration.

I again urge you to hold all funds and require that suitable planning be made to prevent such things as flooding to prevent flooding and closing of public roads.

I thank you for the kind consideration to allow my input into the project. The need for the Richland Creek portion has long been with us as these facilities are already built and in dire need of relief now. I however urge you to withhold these

RUSSELL C. WALTON, JR., D. D. S.
2001 CLARK AVENUE
RALEIGH, NORTH CAROLINA 27605
TELEPHONE 834-5157

funds for at least another year to allow for orderly planning of the Richland Creek basin at least. Haste makes nothing but waste.

Sincerely yours,

Russell C Walton

Russell C. Walton

4212 Oak Park Rd.
Raleigh, N.C. 27612
March 24, 1975

Mr. David R. Hopkins
Chief, E&S Branch
Environmental Protection Agency
Room 203 - 1421 Peachtree St, N.E.
Atlanta, Georgia 30309

Dear Sir,

You and your staff have done a fine job in preparing the Draft Environmental Impact Statement on the Crabtree Creek EPA Project C370344. I thank you for hearing our call for support. I am not against progress to the benefit of the majority, but I am against rapid development for the benefit of a few and at the cost to many.

May I suggest that there are some changes I'd like to recommend for the final impact statement - they are as follows:

1. p.54 An explanation as to why four of the original flood control structures were eliminated since the original fifteen were to provide flood control for 100 year flood levels. Are we still going to be provided with 100 year flood protection with only eleven structures?

2. p.55 "There are not sufficient funds to acquire land for remaining structures". - Yet on p. 54 these funds were voted by the people of

of Wake county in 1965. What protects the Wake voters from the same mistakes of the County leaders in 1975-76?

3. p. 137, "Grant funds shall be withdrawn Jan. 1, 1976, ... or agreement on other measures to insure adequate flood protection is not reached." What other measures, agreement by and with who?

Recommendations-:

1. Grant funds should be with held. until all land rights have been aquired and contracts for construction granted on all flood control structures.
2. The dead line of Jan. 1, 1976 be extended until 1 Jan, 1980.
3. Studies made to determine what additional measures should be taken to assure protection from 100 year flood.
4. No further development be started until flood control structures are completed.

I was present on the night of the hearing in Wake County. I do not recall any one except developers, realitors, and politicians favoring the sewer line project before adequate measures are taken. I have heard and read the statement presented by North-West Community Task Force, Chairman, Mr. Robert E. Giles. I concure With his statement and recommendation I am a resident whos property line extendens to the center of Crabtree Creek. I am very interested in the protections of the property and lives of my neighbors and my family. I hope and trust Agencies like yours Can hold the single interest developers still long enough to provide protection to the rest of us.

Thank you for the chance to respond to your draft before We find ourselves in a situation far Worse than it is already.

James L. Riley

March 29, 1975

Mr. David R. Hopkins
Chief, EIS Branch
Environmental Protection Agency
1421 Peachtree Street, NE
Atlanta, Georgia 30309

Dear Mr. Hopkins:

This letter is in reference to the public hearing on March 13, 1975 in Raleigh, North Carolina concerning EPA Waste Water Treatment Project C-370334 Crabtree Creek interceptor sewer system, Wake County, as covered in the Draft Environmental Impact Statement for this Project, EPA 904/9-75-001.

We would like to draw your attention to the statement made on page 86 of the Impact Statement that "Trenton Road may be closed during construction since the interceptor is projected to run 400 feet down its center line." In addition, on page 87 the following statement occurs: "The impact on traffic from these crossings, excepting Trenton Road, is anticipated to be slight and of short duration." The implication of these statements in fact indicates that Trenton Road will be closed for some period of time for the construction of the sewer line. The location of the sewer crossing Trenton Road is indicated in Figure 17, page 66. The sewer also crosses Reedy Creek Road (east of I-40); however, it is not clear whether the road will be closed or the sewer line will go in under the bridge at Reedy Creek Road and Richland Creek.

It should be pointed out that it is of primary importance that both Trenton and Reedy Creek Roads are not closed simultaneously as no access to and from the places of residence of those of us living on Reedy Creek and Trenton Roads (1655 and 1650) would be possible. If the construction of the sewer line does not alone seal off the area, then the sewer construction in conjunction with the recent plans of the SCS to relocate Structure 11 north of Road 1650 will. The plans of the SCS are to condemn Reedy Creek Road and then close it so that it can be flooded. The construction of Structure 11 simultaneously with or before the construction of the sewer line on Trenton Road would necessarily imply, then, that the affected areas of Reedy Creek and Trenton Roads would be completely inaccessible to the people living there. Access to and from work would be denied us. This, of course, is an intolerable situation. The planned temporary closing of

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Trenton Road for construction of the sewer line is indeed questionable in light of the actions of the SCS in the past thirty days first in relocating Structure 11 and then in planning the closing of Reedy Creek Road.

Since the SCS Flood Control plan was initiated in 1964 an impact statement on the dam systems should be required before action is taken. Furthermore, we feel that the closing of Trenton Road for any length of time for construction of the sewer line should be reevaluated in light of the SCS shift in placement of Structure 11 and the attendant closing of Reedy Creek Road.

Thank you for your attention to this matter.

Sincerely yours,

Terry S. Dunn

Dr. Terry S. Dunn

William L. Dunn

Dr. William L. Dunn

3715 Trenton Road
Raleigh, North Carolina 27607

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David R. Hopkins
Chief, EIS Branch
Environmental Protection Agency
Room 208-1421 Peachtree St., N.E.
Atlanta, Georgia 30309

Dear Sir:

In reference to the public hearing held at Raleigh, N. C. on March 13 concerning EPA Project C370334, Crabtree Creek sewer outfall extension, I call your attention to the error of Mr. Jack Smith of the Wake Soil and Water Conservation District. I call your attention to page 56, table 6, and the accompanying project map Crabtree Creek Watershed and refer to Structure #11. I ask you to take note of this structure as given in table 6 and on the map as it is 100% wrong.

We are now informed that this structure has now been moved as of the last thirty days, and results in the closing of Reedy Creek road 1650 as shown on the map, to accomodate a 16 acre permanent pool which would all but cover the bridge.

I urge you to delay any granting of funds until at least this error of structure #11 has been considered seriously.

Reedy Creek Road is the primary road to and from our place of employment for those of us that live along roads #1650 and #1655. Considerable traffic along this road consists of slow moving, heavy farm machinery which is incompatible with traffic moving along the only other longer alternate route. We have asked for a traffic study, but have as yet to see it.

I again urge you to hold all funds and require that suitable planning be made to prevent such things as flooding to prevent flooding, and closing of public roads.

Sincerely
Mrs Lucille Grissom

David R. Hopkins
Chief, EIS Branch
Environmental Protection Agency
Room 208-1421 Peachtree St., N.E.
Atlanta, Georgia 30309

Dear Sir:

In reference to the public hearing held at Raleigh, N. C. on March 13 concerning EPA Project C370334, Crabtree Creek sewer outfall extension, I call your attention to the error of Mr. Jack Smith of the Wake Soil and Water Conservation District. I call your attention to page 56, table 6, and the accompanying project map Crabtree Creek Watershed and refer to Structure #11. I ask you to take note of this structure as given in table 6 and on the map as it is 100% wrong.

We are now informed that this structure has now been moved as of the last thirty days, and results in the closing of Reedy Creek road 1650 as shown on the map, to accomodate a 16 acre permanent pool which would all but cover the bridge.

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Reedy Creek Road is the primary road to and from our place of employment for those of us that live along roads #1650 and #1655. Considerable traffic along this road consists of slow moving, heavy farm machinery which is incompatible with traffic moving along the only other longer alternate route. We have asked for a traffic study, but have as yet to see it.

I again urge you to hold all funds and require that suitable planning be made to prevent such things as flooding to prevent flooding, and closing of public roads.

Mrs Mary H Chappell
5207 Trenton Rd
Raleigh, N.C 27607

MR. AND MRS. REX GARY SCHMIDT
3700 Trenton Road — Raleigh, N. C.
27607

March 27, 1975

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REGION IV, ATLANTA, GA.

Mr. David R. Hopkins
Chief, EIS Branch
Environmental Protection Agency
1421 Peachtree Street, N.E.
Room 208
Atlanta, Georgia 30309

Dear Mr. Hopkins:

This letter refers to the public hearing held in Raleigh, North Carolina, on March 13, 1975, concerning EPA Project C 370334, Crabtree Creek sewer outfall extension, Wake County, as covered in the Draft Environmental Impact Statement for this Project: EPA 904/9-75-001.

An error exists in the accompanying map on page 56, Crabtree Watershed, the location of structure no. 11 is different from that now being considered by the Wake Soil and Water Conservation District, represented by Mr. Jack Smith.

A new site has been selected and is being developed downstream on Richland Creek from that shown on the above-mentioned map. Its location will not only take away excellent pasture land of my neighbor, Dr. Russell Walton, but in establishing the new dam site to create a flood pool to control flooding downstream, it will deprive all of us living on Trenton Road (1655) and Reedy Creek Road (1650) convenient access to and from our homes and property.

Further, these roads are in constant use not only by the residents but by the State Farm for moving heavy farming equipment back and forth between different units of the Farm. And the closing of Reedy Creek Road will create a hardship on its users, double the mileage and driving costs of the residents and users, and cause a devaluation of our properties. The 16-acre permanent lake proposed along with the so-called 100-year flood pool need not cause the closure of the road and the bridge over Richland Creek; and if this is absolutely necessary, then mitigation should be provided through construction of a new bridge sufficient to abrogate this problem.

I urge that there be a delay in granting funds for this project until further study and reexamination of the newly-proposed Richland Creek dam structure and proposed pool has been fully considered in the context as it affects those people living on and using the roads.

I have spent considerable time and money in rebuilding and in the development of my property for my retirement. I am a professional Wildlife Specialist, interested in improving the environment and habitat for native wildlife. Recognizing that some land must be sacrificed to provide downstream protection in case of flooding, I'm also aware that the rights and interests of many individuals are sacrificed without effective mitigation. Planning is not always considerate, but often follows the most expedient manner without considering individual taxpayers whose hopes and aspirations are worthy of consideration.

Again, I urge that EPA withhold funds and approval of this part of the Crabtree Project until mitigation required by this alternate dam site is considered in the light of the economic and transportation impact on the residents and users of Reedy Creek Road.

Sincerely yours,

Rex Gary Schmidt

RGS/dw

CC: Wake County Commissioners
Wake Soil and Water Conservation District
Soil Conservation Service
Dr. Russell Walton
Mr. Ernest Stone
Mrs. Ora Lee Jones
Mr. Marvin Moss
Mr. Bill Dunn
Dr. James A. Valone
Other interested persons

4312 Oak Park Road
Raleigh, N. C. 27612
March 25, 1975

Mr. David R. Hopkins, Chief, EIS Branch
Environmental Protection Agency
Room 208 - 1421 Peachtree Street, N. E.
Atlanta, Georgia 30309

Dear Mr. Hopkins:

My wife and I would like to commend your efforts on the Impact Statement and are very grateful that it was undertaken. We fully agree with your conclusion that "development of the upper watershed must not be allowed at the expense of further endangering property and lives in the downstream areas."

I'm sorry that I was unable to attend the hearing on March 13, as I was out of town on business. My wife did attend and took notes and gave me a copy of the statement by Robert Giles. I would like to go on record as endorsing his statement, and I reiterate the following recommendations for the final Environmental Impact Statement:

1. That the funds for the sewer line be withheld until the required dam sites for protection against a 100-year flood have been acquired and contracts for the dams have been let.

2. That if the sewer line is not built, permits for package plants (with their attendant development) should not be issued until the required dams are in place.

3. That the question of the rainfall frequency which is the basis for flood control design criteria be resolved.

4. That the "other measures" (Page 137) to insure adequate flood control be fully defined. These "other measures" should be analyzed thoroughly and should be shown to equal or surpass the dams in ability to control floods prior to their being accepted. "Other measures" should not become a convenient loophole.

5. That the $1.9 million average annual flood damage not be considered acceptable. It seems that this is much too high a level for the annual average. Why not include, as a grant condition, the requirement for county land use plans which would restrict development to a level yielding no damage when the flood control dams are in place.

6. That the proposed sewer line not be tied into the city sewer line until the dams are complete.

Thank you for your interest.

Sincerely yours,

Lloyd M. Hedgepeth

Lloyd M. Hedgepeth

Copy to James Waller, Corpsof Engineers

23 Dixie Trail
Raleigh NC
March 23 1975

David R. Hopkins

Chief, Eis Branch
Environmental Protection Agency
Room 208 - 1421 Peachtree St., N.E.
Atlanta, Ga. 30309

In regard to EPA Project C370334, Crabtree Creek sewer outfall extension, I call your attention to page 56, table 6, and the accompanying project map Crabtree Creek watershed and refer to Structure #11. We have been informed that this structure has now been moved, as of the last thirty days, and because it has been moved, Reedy Creek Road will be closed.

Reedy Creek road is the primary road to and from our place of employment for those ~~of us~~ who live along roads #1650 and 1655.

I urge you to delay any granting of funds until at least this error of structure #11 has been considered, and the matter resolved. I urge you to hold all funds and require that suitable planning be made to prevent such things as flooding to prevent flooding and closing of public roads.

I have owned land on road #1655 for about forty years, and the closing of Reedy Creek Road will seriously devalue my property.

Sincerely,

Mrs. Ben L. Clifton

LAW OFFICES
BLANCHARD, TUCKER, TWIGGS & DENSON
404 BRANCH BANK & TRUST BUILDING
P. O. DRAWER 30
RALEIGH, NORTH CAROLINA 27602
TELEPHONE (919) 828-4357

CHARLES F. BLANCHARD
IRVIN B. TUCKER, JR.
HOWARD F. TWIGGS
ALEXANDER B. DENSON
THEODORE E. CORVETTE, JR.
ROBERT A. HASSELL
CHARLES A. PARLATO
THOMAS A. EARLS
MARY CATHERINE HOLCOMB,
OF COUNSEL

CARY OFFICE:
119 W. MAYNARD ROAD
P. O. BOX 117
CARY, NORTH CAROLINA 27511
TELEPHONE (919) 467-0195

March 24, 1975

Mr. David R. Hopkins
Chief, E.I.S. Branch
Environmental Protection Agency
Room 208
1421 Peachtree Street, N.E.
Atlanta, Georgia 30309

Re: EPA Project C370344

Dear Mr. Hopkins:

We represent Mr. A. J. Harmon, who is the Volkswagen dealer in the Raleigh area and controls the corporation upon which the Volkswagen building and other buildings are located.

Mr. Harmon has invested over $1,000,000 in the land and buildings involved. The first time the Volkswagen building was flooded, Mr. Harmon had no knowledge of the flooding danger to the land.

The Volkswagen building and business was flooded in both the June and February floods of 1973, and great damage was suffered. As late as March 19, 1975, flooding of the Volkswagen building was threatened to such an extent that cars had to be moved. Fortunately, the flood on March 19 did not materialize to the point that the Volkswagen place was flooded.

Mr. Harmon has too much invested in this property near Crabtree Creek to gamble on whether or not this project will increase the flood danger.

Mr. Harmon's property is already greatly diminished in value because of the other two floods, and one more could be total disaster.

On behalf of Mr. Harmon and his enterprises, we desire to go on record as opposing the above-named project unless and until all of the proposed dams on Crabtree Creek are completed.

Very truly yours,

IRVIN B. TUCKER, JR.

IBT/cm

cc: Mr. A. J. Harmon

Dear Sir

I understand that due to the Construction of a Dam on Richlands Creek for flood control Reedy Creek Road (1650) will be closed. I live on Trenton Road (1655) Which run ~~to~~ into Reedy Creek Road. If Reeky Creek Road is closed near the intersection it would Cause me and my neighbors to drive more miles to work and would be a real hardship for us We do not object to the flood control program or a lake near our homes we only object to the closing of Reeky Creek Road (1650).

Sincerely
Mr & Mrs Robert Butler

Last minute changes
make Lasting Errors.
Save our bridge at
Richland Creek from the
Pool. Make Structure #11
As shown on Page 56.

John W. Connelly Jr.

Dear Mr. Hopkins
Help save our bridge at
Richland Creek on Road #1650
From the S.C.S. Flooders – Keep
Structure #11 as shown on P56
of Impact Statement.

Thomas H. Crum Jr.

Dear Mr. Hopkins
Help save our road #1650 and
bridge at Richland [illegible]
from "Jack Smith's Flood".
Make structure^{67} #11 as shown
on page 56 of statement.

James C. Johnson
1866 Harrison Ave
Cary, N.C. 27511

Dear Mr. Hopkins

Save our road #1650 and bridge from "Jack Smith's Flooders" — Keep Structure #11 as shown on Page 56.

Russell Lee Walton

Dear Mr. Hopkins —

Hold funds for Crabtree Creek Sewer Outfall until Structure #11 is replaced as [illegible] on P 56.

Bill White

Dear Mr. Hopkins

Haste makes Waste —

Save our money by withholding funds for Crabtree Creek Sewer outfall Until Structure #11 is built as shown on P 56 of Statement.

J E Hendren

Dear Mr Hopkins

Don't change the plans in the middle of Richland Creek. Keep Structure # 11 as shown on P 56 of Impact Statement.

mary walton
6000 Reedy Creek Rd
Raleigh N.C. 27603

Dear Mr Hopkins

Help! Jack Smith wants to [illegible] our road Bridge + [illegible] but he [illegible] live in Richland — Keep Structure # 11 as shown on P 56

Margie G. Walton
6000 Reedy Ck Rd

Dear Mr Hopkins

Last minute changes

Make last minute [illegible].

Save our Road # 1650 + Bridge from the Flooders. Make Structure # 11 as shown on Page 56

Dear Mr. Hopkins
Save our road #1650
and bridge at Richland
Creek from the S.C.S.
flooders — Help keep Structure
#11 as shown on P 56 by delay
in granting funds Martha
Mallow

Dear Mr. Hopkins
Don't Change the
Plans in the Middle of
the Creek. Keep Structure
#11 as shown on P 56

Dear Mr. Hopkins
Help us keep Structure
#11 as shown on Page
56 of Impact Statement.
No Last minute Changes —

This location has many
endangered wild flowers
and is a good birding sight.

Joe K. Martin
Raleigh, N.C.

EPA Project
C-370334
Help!! Don't mislead
us. Make Structure
#11 As shown
On Page #56
Impact Statement
Or Withhold
Funds — No
Unscheduled Changes!
Please
Charles Kutta

APPENDIX 13

FLOOD FREQUENCY DATA

DEPARTMENT OF THE ARMY
WILMINGTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1890
WILMINGTON, NORTH CAROLINA 28401

SAWRM

11 April 1975

Mr. Robert B. Howard
Project Officer, Crabtree Creek EIS
Environmental Statement Branch
Environmental Protection Agency
1421 Peachtree Street, N.E.
Atlanta, GA 30309

Dear Mr. Howard:

In reply to your 31 March 1975 letter concerning questions that have arisen from the draft Environmental Statement on Crabtree Creek sewerline interceptor, I have attached a "Procedure for Estimating Flood Damages."

In addition, based on our hydrologic analysis of streamflow and using flood flows measured by the U.S. Geological Survey, we have determined that the February 1973 flood on Crabtree Creek was approximately a 10-year frequency flood and the June 1973 flood was approximately a 20-year flood. These flood frequencies should not be confused with rainfall or storm frequencies--the frequency of a flood is determined not only by the amount, duration, intensity, and distribution of rainfall, but also by soil permeability, antecedent soil-moisture conditions, land slope, and ground cover, to name a few factors.

We trust these comments will answer your questions. Please contact us if you have any other questions.

Sincerely yours,

E. G. LONG, JR.
Chief, Engineering Division

1 Incl
As stated

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Procedure for Estimating Flood Damages

Generally, the first step in evaluating a flood problem is the determination of the depth and frequency of flooding within the flood plain area. Studies are made of historical flood records and computations made to determine the stage-frequency relationship of floods. For simplicity, this relationship can be converted to a stage-exceedence curve which shows the number of times in a 100-year period one could reasonably expect flood waters to reach a certain stage or elevation.

With these and other data provided by hydrologists within the Corps, flood profiles and flood plain maps can be delineated to determine the extent of flood prone areas. These data are then turned over to economic evaluation personnel. With these data, a study is made to determine the damages that would occur within the flood prone area from flood events of various sizes. This determination is made by an actual field survey of all properties located in the flood plain. This survey includes estimates of the value of real and personal property and the elevation of each structure within the flood plain. With this information and historic information on damages from flooding on all types of property plus current estimates of repair or replacement costs, a stage-damage curve for the study is developed. This curve indicates the amount of damages expected to occur if flooding should reach various stages or elevations.

The stage-damage curve and the stage-exceedence curve have a common factor; i.e. stage. This enables the economist to combine these curves into a damage-frequency or exceedence curve that shows the number of times within a 100-year period that a specific level of damages will occur. By determining the area under this curve, average annual damages under existing conditions can be determined. This simply means that by considering the changes of flood events occurring and their associated damages plus averaging these damages over a 100-year period, we can state that, on the average, so many dollars in damages can be expected to occur every year over the 100-year period.

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL WEATHER SERVICE

P.O. Box 25879 Raleigh, N.C. 27611
March 8, 1975

Mr. Robert E. Giles
4216 Oak Park Road
Raleigh, N. C. 27612

Dear Mr. Giles:

This is in response to your request for information on the recorded amount of rainfall which fell in the Crabtree basin area in connection with the floods which occurred May 11, 1957, February 2, 1973 and June 29, 1973. You also requested the average 24-hour rainfall amounts with various recurrence frequencies, for Wake County, as shown in the United States Weather Bureau Rainfall Frequency Atlas, Technical Paper No. 40.

Attachment No. 1 lists the average 24-hour precipitation amounts, with various recurrence frequencies, for Wake County. This data was interpolated from Charts 43-49 of the Rainfall Frequency Atlas, Technical Paper No. 40. The data in this Atlas is based solely upon past climatalogical data and may be used as a working guide to practical problems involving rainfall frequency.

Attachment No. 2 is a map showing the measured amounts of precipitation recorded by the National Weather Service for the storms of February 2, 1973 and June 29, 1973 in the Crabtree basin area. This data was recorded by volunteer observers, some being employees or retired employees of the National Weather Service and others who receive instruction in accurate measurement of rainfall and who participate in the recording program of the Weather Service, using Taylor plastic rain gauges with a 4-inch diameter. The measurements at Raleigh-Durham Airport, Durham, Wilsonville and Neuse reporting stations were made by official Weather Service observers, using 8-inch standard gauges.

Attachment No. 3 lists the published climatalogical data preceeding and including the storms of May 11, 1957, February 2, 1973 and June 29, 1973 for the Weather Service gauge at Raleigh-Durham Airport.

With reference to the storm in May, 1957, the climatalogical data form attached is the only record of the National Weather Service on recorded rainfall in the Raleigh area, with which I am familiar, since the volunteer observer network was not set up until 1970.

Sincerely,

Thomas A. Zickus
Hydrologist

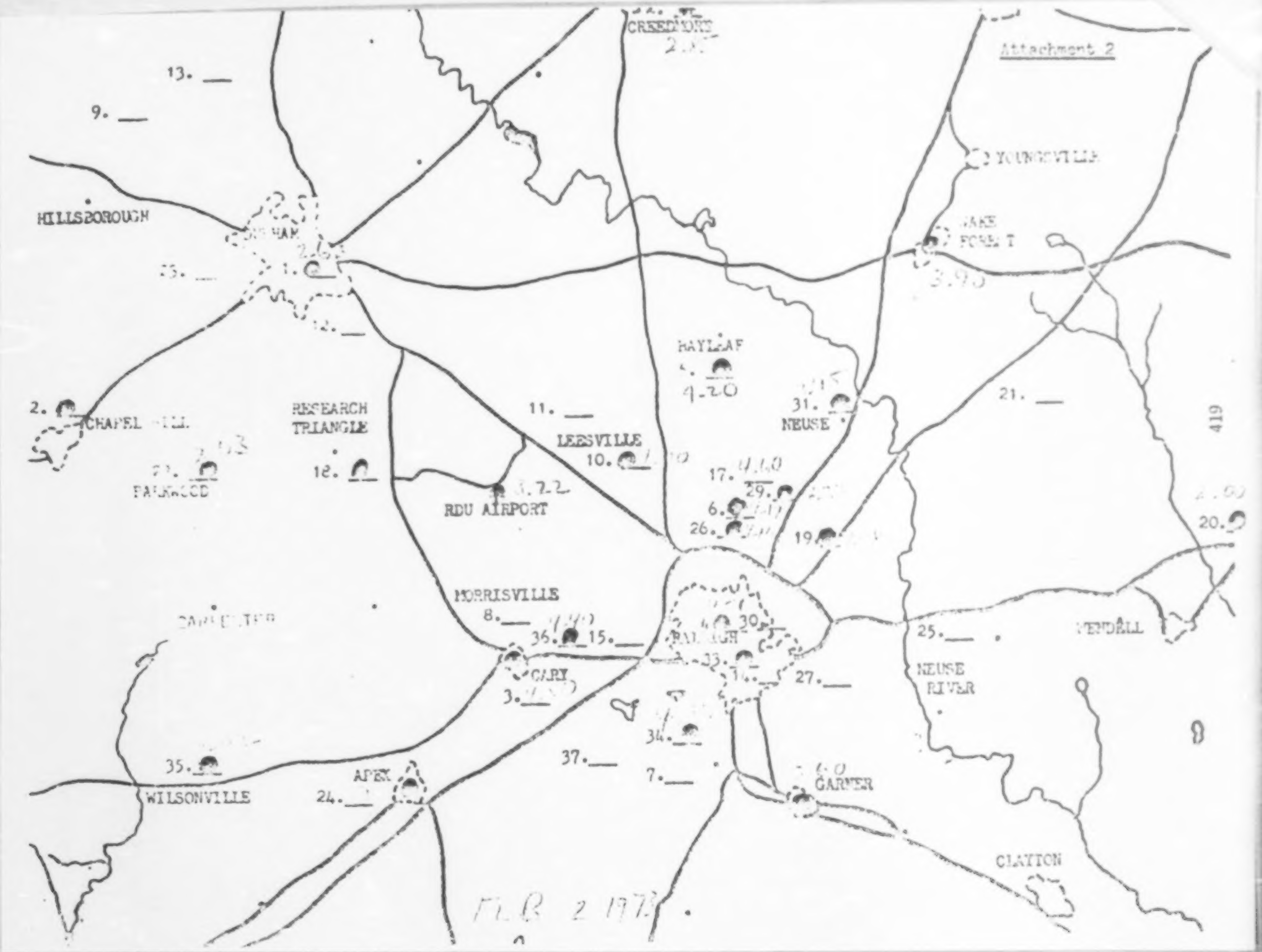
attachments

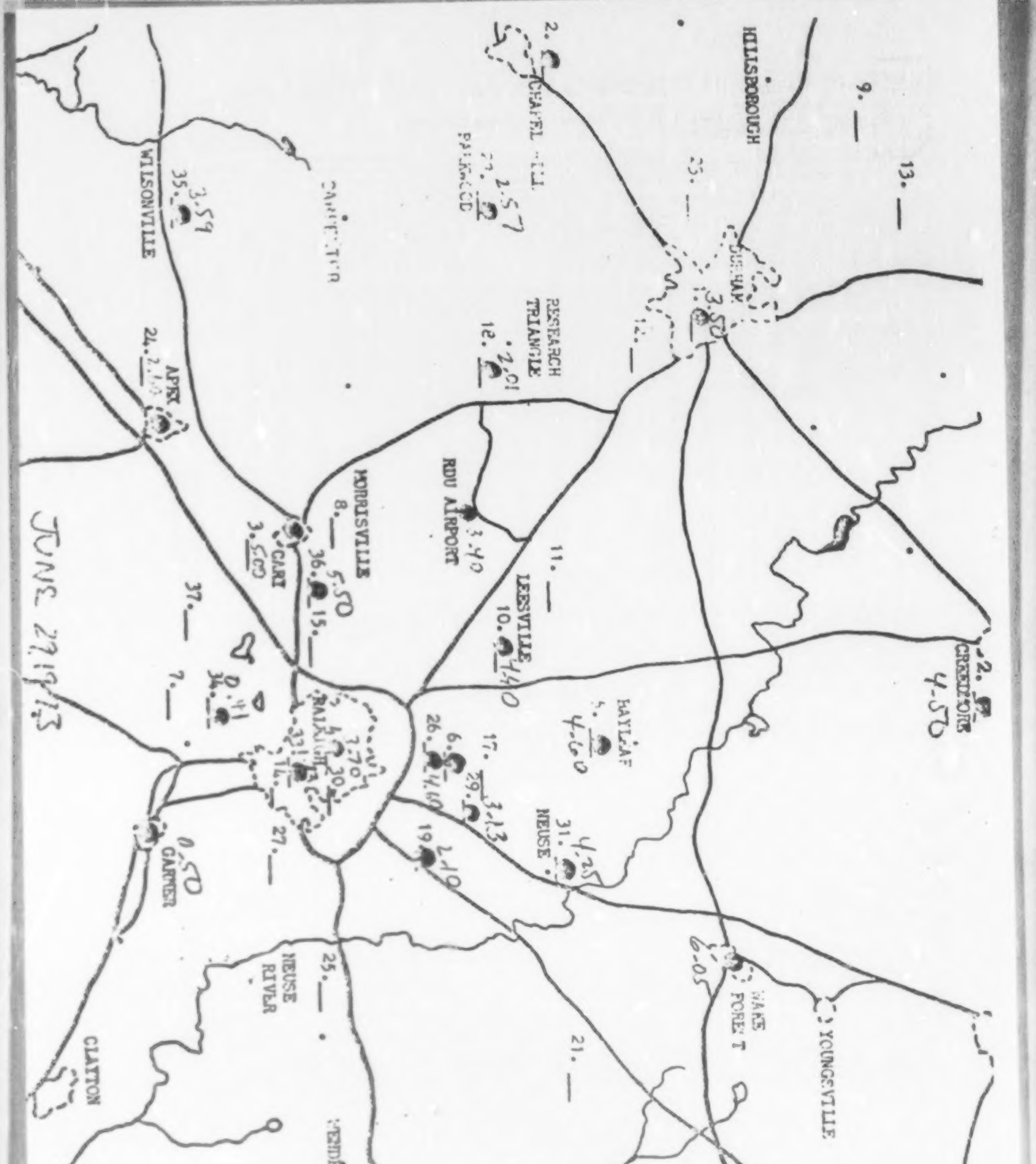
Rainfall frequency during 24-hour period -- for Wake County area as shown in RAINFALL FREQUENCY ATLAS OF THE UNITED STATES (Technical Paper No. 40), published by the United States Weather Bureau, 19 61

Frequency	Amount (inches)
1-year	3.0
2-year	3.6
5-year	4.75
10-year	5.70
25-year	6.50
50-year	7.25
100-year	8.0

Note: Technical Paper No. 40 is the most current Rainfall Frequency Atlas, published by the National Weather Service, applicable to Southeastern United States.

Attachment 2




HILLSBOROUGH
9. —
13. —
DURHAM
3.50
23. —
14. —
2. CHAPEL HILL
22. PARKWOOD 2.57
CARPENTER
WILSONVILLE
35. 3.59
RESEARCH TRIANGLE
12. 2.01
APEX
24. 2.10
MORRISVILLE
8. —
RDU AIRPORT 3.40
CARY
3. 3.50
36. 5.50
15. —
11. —
LEESVILLE
10. 4.40
37. —
7. —
34. 0.41
RALEIGH
3.70
33
16
30
27. —
CREEDMOOR
2. 4.50
BAYLEAF
5. 4.60
17. —
26.
6. 4.60
29. 3.13
NEUSE
31. 4.25
19. 2.10
GARNER 0.50
WAKE FOREST 6.05
YOUNGSVILLE
NEUSE RIVER
25. —
21. —
CLAYTON
WENDELL
20. 0.52
JUNE 27,1973

LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

RALEIGH, NORTH CAROLINA
NAT WEATHER SERVICE FCST OFC
RALEIGH-DURHAM AIRPORT
JUNE 1973

Attachment 3

Latitude 35° 52' N Longitude 78° 47' W Elevation ground: 434 ft Standard time used: EASTERN #13722

Weather types on dates of occurrence: 1 Fog; 2 Heavy fog X; 3 Thunderstorm; 4 Ice pellets; 5 Hail; 6 Glaze; 7 Duststorm; 8 Smoke, Haze; 9 Blowing snow

Date	Temperature °F Maximum	Minimum	Average	Departure from normal	Average dew point	Degree days Base 65 Heating	Cooling	Weather types on dates of occurrence	Snow, ice pellets or ice on ground at 07AM In.	Precipitation Water equivalent In.	Snow, ice pellets In.	Avg station pressure In. Elev. 441 feet m.s.l.	Wind Resultant direction	Resultant speed m.p.h.	Average speed m.p.h.	Fastest mile Speed m.p.h.	Direction	Sunshine Hours and tenths	Percent of possible	Sky cover Tenths Sunrise to sunset	Midnight to midnight	Date
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	78	61	70	-2	57	0	5	8	0	0	0	29.53	33	2.0	7.1	12	36	9.1	63	7	5	1
2	87	57*	72	0	61	0	7		0	0	0	29.60	15	2.0	5.2	12	29	12.2	84	3	2	2
3	89	65	77	5	65	0	12	8	0	0	0	29.66	17	8.3	8.6	13	18	12.3	85	2	2	3
4	87	65	76	3	65	0	11	1 8	0	0	0	29.71	19	6.0	7.3	12	26	13.2	91	1	1	4
5	87	64	76	3	65	0	11	1 8	0	0	0	29.71	19	6.0	6.6	10	21	13.1	91	5	4	5
6	86	67	77	4	66	0	12		0	T	0	29.67	19	7.1	7.5	14	18	10.1	70	7	7	6
7	84	66	75	1	67	0	10	1	0	.22	0	29.68	20	4.3	5.3	12	20	10.3	71	5	7	7
8	84	63	74	0	68	0	9	1 8	0	0	0	29.74	17	2.9	3.3	12	15	9.1	63	7	7	8
9	83	65	74	0	69	0	9	1 8	0	T	0	29.72	22	6.0	6.6	12	21	9.3	57	8	8	9
10	87	67	77	3	69	0	12	2	0	T	0	29.65	19	5.2	5.6	9	18	10.2	75	8	7	10
11	87	67	77	2	69	0	12	2	0	0	0	29.62	19	5.2	6.2	13	18	10.8	74	7	7	11
12	83	68	76	1	69	0	11	1 3	0	.10	0	29.56	17	8.0	8.1	14	18	7.7	53	8	8	12
13	85	71	78	3	72	0	13	1 3 8	0	.33	0	29.49	24	5.2	6.3	9	24	3.9	26	9	9	13
14	83	67	75	-1	67	0	10	1 8	0	0	0	29.55	01	4.0	5.8	12	06	10.7	74	7	6	14
15	85	61	73	-3	66	0	8	1 8	0	0	0	29.58	14	3.1	5.3	10	15	8.5	58	6	6	15
16	85	68	77	1	70	0	12	1 8	0	.12	0	29.45	15	6.6	7.8	14	19	6.1	42	9	7	16
17	95*	69	82*	6	70	0	17	1 3 8	0	.25	0	29.34	04	.4	9.2	18	08	10.7	73	4	5	17
18	83	69	76	0	69	0	11	1 3 8	0	.07	0	29.44	01	4.8	6.9	11	02	6.1	42	7	8	18
19	74	65	70*	-6	65	0	5	1	0	T	0	29.61	02	4.9	6.5	12	36	0.4	3	10	10	19
20	89	68	79	2	70	0	14	1 3 8	0	.35	0	29.68	13	2.5	6.2	13	11	6.0	41	9	9	20
21	87	67	77	0	70	0	12	23	0	.47	0	29.66	11	3.7	4.9	18	17	6.7	46	9	8	21
22	79	68	74	-3	70	0	9	1 3 8	0	1.15	0	29.61	21	5.9	6.8	13	29	0.5	3	10	10	22
23	83	68	76	-1	68	0	11	1 8	0	T	0	29.56	07	1.5	5.3	9	02	5.8	40	9	7	23
24	85	62	74	-3	67	0	9	23 8	0	2.90	0	29.52	04	2.5	3.0	21	15	6.0	41	7	6	24
25	86	62	74	-3	65	0	9	1 8	0	0	0	29.50	02	4.2	4.8	9	06	11.3	77	4	3	25
26	83	64	74	-3	67	0	9	2 8	0	T	0	29.52	05	5.5	5.6	12	05	9.4	64	9	8	26
27	85	69	77	0	68	0	12	1 3 8	0	0	0	29.46	03	3.7	3.9	7	09	9.2	63	7	7	27
28	85	66	76	-2	70	0	11	1 3 8	0	1.55	0	29.35	17	5.7	7.2	14	15	5.6	38	8	7	28
29	83	66	75	-3	69	0	10	1 3 8	0	1.87	0	29.30	24	5.2	6.3	10	21	8.2	56	7	8	29
30	84	59	72	-6	65	0	7	1 8	0	0	0	29.44	19	3.4	3.7	8	21	9.8	68	8	5	30
	Sum	Sum				Total	Total	Number of days		Total	Total	For the month						Total	%	Sum	Sum	
	2541	1965				0	310			9.38	0	29.57	18	2.2	6.1	21	15	251.3	for	207	194	
	Avg	Avg	Avg	Dep	Avg	Dep	Dep	Precipitation ≥ .01 inch	12	Dep						Date	24	Possible for month	month	Avg	Avg	
	84.7	65.5	75.1	0.0	67	0				5.68								436.5	58	6.9	6.5	

Number of days				Season to date			
Maximum Temp		Minimum Temp		Total	Total	Snow, ice pellets ≥ 1.0 inch	0
≥ 90° ‡	≤ 32°	≤ 32°	≤ 0°	3462	441	Thunderstorms	11
				Dep	Dep	Heavy fog X	5
1	0	0	0	69		Clear 3	Partly cloudy 14

Cloudy 13

Greatest in 24 hours and dates			Greatest depth on ground of snow, ice pellets or ice and date
Precipitation		Snow, ice pellets	
3.42	28-29	0	0

HOURLY PRECIPITATION (Water equivalent in inches)

Date	A.M. Hour ending at 1	2	3	4	5	6	7	8	9	10	11	12	P.M. Hour ending at 1	2	3	4	5	6	7	8	9	10	11	12	Date
1																									1
2																									2
3																									3
4																									4
5																									5
6									T	T													T	T	6
7	T				T	.18	.04	T																	7
8																									8
9													T	T		T	T								9
10						T	T																		10
11																									11
12																							T	.10	12
13	.07	.11	.15	T																					13
14																									14
15																									15
16	.01	T			T	.11	T																		16
17																		T					.07	.18	17
18	.05	.01									T														18
19					T	T	T																		19
20																T	.25			T	.06	.03	.01	T	20
21																	.08	.32	.05	T			T	.01	21
22			.02										T	.55	.05	.02	.05	.16	.05	.08	.08	.06	.03	T	22
23	T		T	T	T	T	T																		23
24																	2.45	.41	.01						24
25																									25
26																				T					26
27																									27
28											T				T	T						T	.15	1.40	28
29	.62	.85	.30	.03	.07																				29
30																									30

* Extreme temperatures for the month. May be the last of more than one occurrence.
– Below zero temperature or negative departure from normal.
‡ ≤ 70° at Alaskan stations.
+ Also on an earlier date, or dates.
X Heavy fog restricts visibility to ¼ mile or less.
T In the Hourly Precipitation table and in columns 9, 10, and 11 indicates an amount too small to measure.

The season for degree days begins with July for heating and with January for cooling.
Data in columns 6, 12, 13, 14, and 15 are based on 8 observations per day at 3-hour intervals.
Wind directions are those from which the wind blows. Resultant wind is the vector sum of wind directions and speeds divided by the number of observations. Figures for directions are tens of degrees from true North; i.e., 09 = East, 18 = South, 27 = West, 36 = North, and 00 = Calm. When directions are in tens of degrees in Col. 17, entries in Col. 16 are fastest observed 1-minute speeds. If the x appears in Col. 17, speeds are gusts.
Any errors detected will be corrected and changes in summary data will be annotated in the annual summary.

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William H. Haggard
Director, National Climatic Center

SUMMARY BY HOURS

Hour Local time	Averages Sky cover Tenths	Station pressure In.	Temperature Air °F	Wet bulb °F	Dew Pt. °F	Relative humidity %	Wind speed m.p.h.	Resultant wind Direction	Speed m.p.h.
01	5	29.57	68	67	66	94	4.5	18	2.7
04	6	29.56	67	66	65	96	4.3	19	1.4
07	7	29.59	69	68	67	94	5.8	19	1.4
10	7	29.60	77	71	68	75	7.3	23	1.6
13	8	29.55	81	72	67	64	8.4	19	3.0
16	7	29.54	81	72	68	65	5.7	15	2.6
19	7	29.54	76	71	69	79	5.6	15	2.7
22	7	29.57	71	69	68	89	6.1	15	3.4

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LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

RALEIGH, NORTH CAROLINA
NAT WEATHER SERVICE FCST OFC
RALEIGH-DURHAM AIRPORT
FEBRUARY 1973

Latitude 35° 52' N Longitude 78° 47' W Elevation (ground) 434 ft Standard time used EASTERN WBAN #13722

Date	Temperature °F Maximum	Minimum	Average	Departure from normal	Average dew point	Degree days Base 65 Heating	Cooling	Weather types on dates of occurrence	Snow, ice pellets or ice on ground at 07AM In.	Precipitation Water equivalent In.	Snow, ice pellets In.	Avg. station pressure In. Elev. 441 feet m.s.l.	Wind Resultant direction	Resultant speed m.p.h.	Average speed m.p.h.	Fastest mile Speed m.p.h.	Direction	Sunshine Hours and tenths	Percent of possible	Sky cover Tenths Sunrise to sunset	Midnight to midnight	Date
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	61	36	49	7	42	16	0		0	T	0	29.59	09	7.1	9.2	17	13	2.5	24	10	10	1
2	67*	52	60*	19	57	5	0	1	0	3.22	0	29.37	18	12.1	16.4	25	17	0.2	2	10	9	2
3	56	36	46	2	36	21	0		0	T	0	29.31	27	11.0	12.1	23	27	5.8	55	8	4	3
4	59	28	44	2	27	21	0		0	0	0	29.80	22	3.0	4.8	10	28	10.5	100	0	0	4
5	64	33	49	6	32	16	0		0	0	0	29.69	22	2.5	5.2	9	22	7.0	67	7	3	5
6	57	36	46	3	38	19	0	1 3 8	0	.20	0	29.53	01	3.1	6.6	12	28	2.0	19	9	8	6
7	55	38	47	4	37	18	0	1	0	0	0	29.72	36	5.7	8.1	14	01	8.1	76	4	3	7
8	57	37	47	4	41	18	0	1	0	.18	0	29.45	18	4.2	8.2	16	18	0.0	0	10	9	8
9	40	29	35	-8	15	30	0		0	0	0	29.91	36	13.0	13.5	17	35	0.0	0	10	10	9
10	30	22	26	-17	13	39	0	2 9	T	.45	4.5	29.55	02	14.7	16.3	20	02	0.0	0	10	9	10
11	35	21	28	-15	6	37	0		5	0	0	29.78	01	12.6	12.8	18	36	10.7	98	0	1	11
12	40	6*	23*	-20	5	42	0		2	0	0	29.90	01	2.5	4.0	9	03	10.3	94	1	1	12
13	47	12	30	-13	10	35	0		1	0	0	29.87	19	2.6	5.0	8	15	4.1	38	7	5	13
14	53	33	43	0	33	22	0	1	T	.19	0	29.61	12	7.7	10.1	20	13	0.0	0	10	10	14
15	56	39	48	5	43	17	0	2 8	0	0	0	29.33	26	7.9	9.1	13	29	0.7	7	9	9	15
16	41	23	32	-11	14	33	0		0	0	0	29.50	30	13.6	14.1	22	30	3.8	35	8	3	16
17	33	14	24	-19	-2	41	0		0	0	0	29.80	33	12.3	12.5	21	33	11.0	100	0	0	17
18	40	12	26	-17	1	39	0		0	0	0	29.89	14	1.6	4.5	7	07	9.3	82	5	4	18
19	55	20	38	-6	14	27	0		0	0	0	29.81	21	2.9	4.3	8	27	11.1	100	0	1	19
20	58	24	41	-3	21	24	0		0	0	0	29.73	23	4.4	5.9	12	27	6.5	59	6	3	20
21	53	34	44	0	25	21	0		0	0	0	29.60	30	8.7	11.2	25	31	5.3	47	6	5	21
22	46	29	38	-6	10	27	0		0	0	0	29.45	29	9.2	10.4	21	28	9.4	84	0	1	22
23	56	26	41	-3	16	24	0		0	0	0	29.38	27	5.1	5.9	16	28	7.9	71	2	2	23
24	59	26	43	-1	19	22	0		0	0	0	29.70	30	3.0	5.2	15	33	11.2	100	1	1	24
25	66	29	48	4	26	17	0		0	0	0	29.89	13	3.2	5.9	12	13	9.7	86	6	5	25
26	58	45	52	8	47	13	0	1 3 8	0	.73	0	29.72	06	4.7	5.5	12	13	0.0	0	10	10	26
27	51	32	42	-3	35	23	0	1 4 8	0	.53	T	29.67	01	11.9	12.6	17	30	0.0	0	10	10	27
28	52	28	40	-3	26	25	0	1	0	0	0	29.89	30	4.6	6.3	9	34	11.4	100	0	8	28

Weather types: 1 Fog; 2 Heavy fog X; 3 Thunderstorm; 4 Ice pellets; 5 Hail; 6 Glaze; 7 Duststorm; 8 Smoke, Haze; 9 Blowing snow

Sum	Sum				Total	Total		Total	Total	For the month						Total	%	Sum	Sum
1445	796				692	0	Number of days	3.90	4.5	29.69	33	2.6	8.8	20	02	189.2		159	138
Avg	Avg	Avg	Dep	Avg	Dep	Dep	Precipitation	Dep						Date	10	Possible for month		Avg	Avg
51.6	28.4	40.0	-3.0	24	76		≥ .01 inch 7	2.27								[illegible]	52	5.8	4.9

Number of days				Season to date		
Maximum Temp.		Minimum Temp.		Total	Total	Snow, ice pellets ≥ 1.0 inch 1
≥ 90°	≤ 32°	≤ 32°	≤ 0°	2609	0	Thunderstorms 2
				Dep	Dep	Heavy fog X 2
0	1	17	0	117		Clear 10 Partly cloudy 8 Cloudy 10

Greatest in 24 hours and dates				Greatest depth on ground of snow, ice pellets or ice and date	
Precipitation		Snow, ice pellets			
3.22	2	4.5	10	5	11

HOURLY PRECIPITATION (Water equivalent in inches)

Date	A.M. Hour ending at 1	2	3	4	5	6	7	8	9	10	11	12	P.M. Hour ending at 1	2	3	4	5	6	7	8	9	10	11	12	Date
1								T	T						T				T	T	T			T	1
2	.01	.06	.05	.13	.24	.42	.45	.59	.85	.35	T	.06	.01		T	T									2
3												T	T	T											3
4																									4
5																									5
6														.06	.12	.02	T								6
7																									7
8										T	T	T	T			T	.05	.05	.07	T	.01	T	T		8
9																									9
10			T	T	T	.02	.03	.07	.08	.09	.10	.05	.03	T											10
11																									11
12																									12
13																									13
14							T				T	.05	.01	.03	.02	.01	.02	.03	.02	T					14
15																									15
16																									16
17																									17
18																									18
19																									19
20																									20
21																									21
22																									22
23																									23
24																									24
25																									25
26			T	T	.02	T			.45	.23	.03	T						T	T		T	T	T	T	26
27	T	T	.01	.09	T	T		.02	.12	.12	.09	.04	.01	.01	.02	T	T	T	T	T	T				27
28																									28

* Extreme temperatures for the month. May be the last of more than one occurrence.
− Below zero temperature or negative departure from normal.
§ ≤ 70° at Alaskan stations.
+ Also on an earlier date, or dates.
X Heavy fog restricts visibility to ¼ mile or less.
T In the Hourly Precipitation table and in columns 9, 10, and 11 indicates an amount too small to measure.

The season for degree days begins with July for heating and with January for cooling.
Data in columns 6, 12, 13, 14, and 15 are based on 8 observations per day at 3-hour intervals.
Wind directions are those from which the wind blows. Resultant wind is the vector sum of wind directions and speeds divided by the number of observations. Figures for directions are tens of degrees from true North; i.e. 09 = East, 18 = South, 27 = West, 36 = North, and 00 = Calm. When directions are in tens of degrees in Col. 17, entries in Col. 16 are fastest observed 1-minute speeds. If the ... appears in Col. 17, speeds are gusts.
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William H. Haggard
Director, National Climatic Center

SUMMARY BY HOURS

Hour Local time	Averages Sky cover Tenths	Station pressure In.	Temperature Air °F	Wet bulb °F	Dew Pt. °F	Relative humidity %	Wind speed m.p.h.	Resultant wind Direction	Speed m.p.h.
01	6	29.66	35	32	25	66	7.5	35	2.2
04	5	29.65	33	30	23	69	7.1	01	2.5
07	6	29.67	31	28	22	72	6.8	35	3.0
10	5	29.73	40	36	26	57	11.6	36	4.0
13	6	29.65	46	38	25	40	11.5	30	3.1
16	5	29.61	49	40	25	46	10.6	29	3.1
19	5	29.63	42	37	26	56	7.2	30	1.9
22	6	29.66	38	33	25	61	8.2	32	2.2

LOCAL CLIMATOLOGICAL DATA

U.S. DEPARTMENT OF COMMERCE
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RALEIGH, NORTH CAROLINA
NAT WEATHER SERVICE FCST OFC
RALEIGH-DURHAM AIRPORT
JANUARY 1973

Latitude 35° 52' N Longitude 78° 47' W Elevation (ground) 434 ft Standard time used: EASTERN WBAN #13722

Date	Temperature °F: Maximum	Minimum	Average	Departure from normal	Average dew point	Degree days Base 65: Heating	Cooling	Weather types on dates of occurrence (1 Fog, 2 Heavy fog X, 3 Thunderstorm, 4 Ice pellets, 5 Hail, 6 Glaze, 7 Duststorm, 8 Smoke, Haze, 9 Blowing snow)	Snow, ice pellets or ice on ground at 07AM In	Precipitation: Water equivalent In	Snow, ice pellets In	Avg. station pressure In. Elev. 441 feet m.s.l.	Wind: Resultant direction	Resultant speed m.p.h.	Average speed m.p.h.	Fastest mile: Speed m.p.h.	Direction	Sunshine: Hours and tenths	Percent of possible	Sky cover Tenths: Sunrise to sunset	Midnight to midnight	Date
1	2	3	4	5	6	7A	7B	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	68	32	50*	19	59	9	0	1	0	0	0	29.54	25	4.2	10.7	13	36	1.2	12	9	9	1
2	53	37	45	4	22	20	0		0	0	0	29.79	35	10.9	11.5	17	01	0.1	1	10	10	2
3	40	31	36	-5	29	29	0	1	0	.32	0	29.91	05	9.4	9.9	14	06	0.0	0	10	7	3
4	53	35	45	4	40	20	0	2 8	0	T	0	29.57	25	9.6	10.5	14	22	3.6	37	9	9	4
5	49	33	41	-1	35	24	0	2 8	0	.02	0	29.59	26	6.7	8.2	10	31	0.0	0	9	9	5
6	47	32	40	-2	31	25	0		0	.07	0	29.64	33	9.3	11.2	23	33	1.6	16	10	9	6
7	32	23	28	-14	13	37	0		0	.09	.7	29.91	03	10.6	12.1	17	02	0.0	0	10	9	7
8	24	18	21*	-21	14	44	0	1 4 8	4	.77	5.7	29.75	02	14.3	15.5	21	02	0.0	0	10	10	8
9	32	12*	22	-20	10	43	0		5	0	0	29.83	35	9.1	9.4	14	34	9.5	95	1	3	9
10	33	13	23	-19	11	42	0		4	0	0	29.81	02	1.0	6.5	12	01	2.5	25	9	9	10
11	40	16	28	-14	13	37	0	8	4	0	0	29.53	35	5.9	7.9	14	34	9.6	95	1	2	11
12	32	19	26	-16	7	39	0		3	0	0	29.75	35	11.8	12.2	16	03	7.7	77	3	5	12
13	38	18	28	-14	11	37	0		3	0	0	29.85	02	8.7	8.9	15	03	8.3	83	4	5	13
14	45	13	29	-13	15	35	0		2	0	0	29.75	21	9.0	9.8	15	23	9.3	93	3	3	14
15	52	36	44	2	27	21	0		2	T	0	29.57	26	7.0	10.8	15	31	5.0	50	6	7	15
16	52	26	39	-3	27	26	0		T	0	0	29.90	22	5.7	7.9	12	19	10.0	100	2	1	16
17	62	30	46	4	31	19	0		0	0	0	29.87	22	9.9	10.5	15	20	9.6	96	4	4	17
18	65	36	51	9	39	14	0		0	0	0	29.77	21	9.3	9.9	18	24	7.7	76	7	5	18
19	60	44	52	10	49	13	0	1	0	.16	0	29.36	21	8.9	12.2	16	18	1.4	14	9	6	19
20	60	29	45	3	29	20	0		0	0	0	29.42	28	9.5	12.5	18	30	9.8	97	3	2	20
21	50	27	39	-3	19	26	0		0	0	0	29.71	07	8.5	10.8	17	10	6.3	62	8	7	21
22	71*	42	57	15	48	8	0		0	.25	0	29.39	16	10.4	15.5	23	13	4.1	40	8	6	22
23	67	43	55	13	32	10	0		0	0	0	29.40	23	13.5	14.4	23	26	10.2	100	0	0	23
24	52	29	41	-1	22	24	0		0	0	0	29.54	28	6.6	7.6	17	32	10.0	98	1	1	24
25	61	24	43	1	23	22	0		0	0	0	29.74	26	1.9	3.9	8	26	10.2	100	0	0	25
26	58	32	45	3	31	20	0		0	.10	0	29.65	20	4.8	6.0	13	22	2.3	22	10	7	26
27	58	41	50	8	43	15	0	2	0	.17	0	29.41	20	1.0	7.2	13	12	4.0	39	7	6	27
28	52	31	42	0	41	23	0	2 8	0	.73	0	29.30	19	.8	4.6	13	24	0.0	0	10	8	28
29	46	25	36	-6	24	29	0	1	0	T	0	29.31	29	11.9	13.5	21	31	9.7	96	2	2	29
30	46	13	28	-14	10	37	0		0	0	0	29.75	23	5.3	8.3	15	22	10.4	100	3	1	30
31	59	24	40	-2	19	25	0		0	0	0	29.57	16	3.7	5.2	9	09	8.5	83	7	6	31

Sum	Sum				Total	Total
1549	887				790	0
Avg	Avg	Avg	Dep	Avg	Dep	Dep
49.9	28.6	39.3	-2.3	26	65	
					Season to date	
Number of days					Total	Total
Maximum Temp		Minimum Temp			2117	0
≥ 90° ‡	≤ 32°	≤ 32°	≤ 0°		Dep	Dep
0	4	21	0		41	

Number of days		Total	Total	For the month						Total	%	Sum	Sum
		2.07	6.4	29.65	29	2.3	9.8	23	26	172.3	for month	185	168
Precipitation ≥ .01 inch	10	Dep						Date	23+	Possible		Avg	Avg
Snow, ice pellets ≥ 1.0 inch	1	-0.55								311.4	55	6.0	5.4
Thunderstorms	0	Greatest in 24 hours and dates: Precipitation			Snow, ice pellets			Greatest depth on ground of snow, ice pellets or ice and date					
Heavy fog X	6	.83	7- 8		5.7	8		5	9+				
Clear 11	Partly cloudy 6	Cloudy 14											

HOURLY PRECIPITATION (Water equivalent in inches)

Date	A.M. Hour ending at: 1	2	3	4	5	6	7	8	9	10	11	12	P.M. Hour ending at: 1	2	3	4	5	6	7	8	9	10	11	12	Date
1																									1
2																									2
3										T	T	T	.04	.01	.04	.01	T	.04	.03	.01	.02	.12	T	T	3
4	T	T	T	T																					4
5																		T	.01	T	T	.01	T	T	5
6		.01	.03	.01	.01	T	.01																		6
7															T	.01	.01	T	.01	.02	.01	T	.01	.01	7
8	T	.01	.06	.07	.07	.07	.10	.10	.05	.05	.07	.04	.05	T	T	T	.01	.02	T	T	T	T	T		8
9																									9
10																									10
11																									11
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14																									14
15						T	T																		15
16																									16
17																									17
18																									18
19										.05	T	.07	.04												19
20																									20
21																									21
22		T			.01	.02	.07	.01	.05	.05	.03	T	T												22
23																									23
24																									24
25																									25
26																		T	T	.08	.02	T	T		26
27	T	.07	.03	.03	.02	.02																			27
28												T	T	.02	.02	.10	.22	.23	.09	T	.01		.04	T	28
29			T	T																					29
30																									30
31																									31

* Extreme temperatures for the month. May be the last of more than one occurrence.
− Below zero temperature or negative departure from normal.
‡ ≥ 24 at Alaskan stations.
+ Also on an earlier date or dates.
X Heavy fog restricts visibility to ¼ mile or less.
T In the Hourly Precipitation table and in columns 9, 10, and 11 indicates an amount too small to measure.

The season for degree days begins with July for heating and with January for cooling.

Data in columns 6, 12, 13, 14, and 15 are based on 8 observations per day at 3-hour intervals.

Wind directions are those from which the wind blows. Resultant wind is the vector sum of wind directions and speeds divided by the number of observations. Figures for directions are tens of degrees from true North; i.e., 09 = East, 18 = South, 27 = West, 36 = North, and 00 = Calm. When directions are in tens of degrees in Col. 17, entries in Col. 16 are fastest observed 1-minute speeds. If two [illegible] appears [illegible] are gusts.

Any errors detected will be corrected and changes in summary data will be annotated in the annual summary.

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I certify that this is an official publication of the National Oceanic and Atmospheric Administration, and is compiled from records on file at the National Climatic Center, Asheville, North Carolina 28801.

William H. Haggard
Director, National Climatic Center

SUMMARY BY HOURS

Hour Local time	Sky cover tenths	Station pressure in.	AVERAGES Temperature: Air °F	Wet bulb °F	Dew Pt. °F	Relative humidity %	Wind speed m.p.h.	Resultant wind: Direction	Speed m.p.h.
01	5	29.65	36	33	27	71	9.2	27	1.9
04	6	29.64	34	31	26	74	9.5	24	1.5
07	6	29.66	33	30	25	76	8.4	35	1.0
10	6	29.71	40	35	27	62	11.9	32	3.1
13	6	29.66	47	39	27	53	11.7	29	4.7
16	6	29.62	48	39	26	47	11.0	28	3.9
19	5	29.65	41	36	27	60	9.5	32	1.2
22	5	29.67	37	33	26	65	9.9	28	2.1

U. S. DEPARTMENT OF COMMERCE, WEATHER BUREAU

LOCAL CLIMATOLOGICAL DATA

RALEIGH, N. C. (Raleigh-Durham Airport) MAY 1957

Latitude 35° 52' N Longitude 78° 47' W. Elevation (ground) 433 ft. Eastern Standard time used

Date 1	Temperature (°F) Maximum 2	Minimum 3	Average 4	Departure from normal 5	Degree days (base 65°) 6	Precipitation Total (Water equivalent) (In.) 7	Snow, Sleet (In.) 8	Snow, Sleet, or Ice on ground at 7:30 am (In.) 9	Wind Prevailing direction 10	Average speed (m. p. h.) 11	Fastest mile * Speed (m. p. h.) 12	Direction 13	Sunshine Total (hours and minutes) 14	Percent of possible 15	Sky cover Sunrise to sunset (tenths) 16	Midnight to midnight (tenths) 17	Thunderstorms or distant lightning 18	Weather restricting visibility to ½ mile or less 19	20	21	22	23	Date 24
1	84	61	73	+10	0	0	0	0	S	7.[illegible]	12	[illegible]	[illegible]:56	16	8	7							1
2	75	59	67	+4	0	0	0	0	NNE	9.1	17	[illegible]	2:02	15	9	8		F					2
3	60	50	55	-8	10	0	0	0	NE	9.6	18	N	2:17	17	9	9							3
4	56	40	48	-14	17	.04	0	0	NNE	9.6	17	[illegible]	2:45	20	9	7							4
5	66	36	51	-13	14	0	0	0	N	7.9	17	[illegible]	9:47	71	4	4							5
6	69	47	58	-6	7	T	0	0	NW	6.9	16	N	4:40	34	4	4							6
7	77	39	58	-7	7	0	0	0	S	4.9	12 1/	[illegible]	13:51	100	0	0							7
8	81	50	66	+1	0	0	0	0	S	8.2	13 1/	SW	11:14	81	2	2							8
9	82	55	69	+4	0	0	0	0	S	8.9	15	S	9:45	70	3	4							9
10	81	57	69	+4	0	0	0	0	SSW	9.4	14 1/	SSW	12:57	93	9	7							10
11	73	62	68	0	0	4.33	0	0	S	11.6	14	SE	0:55	7	10	10							11
12	82	64	73	+7	0	.07	0	0	ESE	9.4	15	[illegible]	5:04	36	6	6							12
13	86	61	74	+7	0	.01	0	0	SE	5.9	13	SE	5:04	36	7	7	T						13
14	87	65	76	+9	0	.11	0	0	SSE	7.4	15	[illegible]	7:00	50	4	5	T						14
15	88	64	76	+9	0	.04	0	0	SSW	8.0	23	[illegible]	6:08	44	8	6	T						15
16	87	62	75	+8	0	0	0	0	WSW	7.6	20	[illegible]	12:15	87	5	7							16
17	77	59	68	0	0	T	0	0	ENE	9.1	15 1/	[illegible]	3:36	25	9	8							17
18	86	63	75	+7	0	0	0	0	SSE	5.1	20	[illegible]	5:53	43	3	4	DL						18
19	84	66	75	+7	0	T	0	0	SSW	8.0	14	S	6:02	43	9	9	TDL	F					19
20	82	64	73	+4	0	.18	0	0	W	9.3	15	[illegible]	6:30	46	7	6	TDL						20
21	79	57	68	-1	0	.21	0	0	NE	9.7	17 1/	[illegible]	1:50	13	7	9							21
22	78	55	67	-2	0	T	0	0	SE	9.8	17	S	0:00	0	8	8							22
23	88	67	78	+8	0	.05	0	0	SSW	9.3	16	SSW	2:21	16	7	7							23
24	89	66	78	+8	0	T	0	0	SW	6.1	10	SW	9:30	66	7	7	DL						24
25	83	65	74	+4	0	.32	0	0	NE	9.3	18	NE	4:44	33	8	8	TDL						25
26	86	65	76	+5	0	.42	0	0	S	8.5	23	S	1:22	10	9	8	T						26
27	82	64	73	+2	0	.06	0	0	SSW	9.6	17	[illegible]	2:47	19	7	6	TDL						27
28	74	55	65	-6	0	0	0	0	WSW	8.2	12 1/	[illegible]	6:43	47	8	7							28
29	74	54	64	-7	1	0	0	0	N	9.6	16	NE	6:17	44	10	9							29
30	68	56	62	-10	3	.02	0	0	ENE	9.2	14 1/	S	0:00	0	10	9							30
31	79	56	67	-5	0	0	0	0	WNW	9.7	14 1/	[illegible]	4:45	33	6	7							31
Sum	2439	1784				5.86	0			261.7			172:00		213	207							Sum
Avg.	78.7	57.5								8.4	Fastest	Dir	Possible	%	6.9	6.7							Avg.
										Misc.	23 1/	SSW	436:43	39									Misc

T in columns 7, 8, 9 and in the Hourly Precipitation table indicates an amount too small to measure.

TEMPERATURE: (°F)

Average monthly	68.1	
Departure from normal	+0.8	
Highest 89	on 24th	
Lowest 36	on 5th	
Number of days with –		
Max. 32° or below	0	
Max. 90° or above	0	
Min. 32° or below	0	
Min. 0° or below	0	

HEATING DEGREE DAYS (base 65°):

Total this month	59
Departure from normal	+18
Seasonal total (since July 1)	3086
Seasonal departure from normal	-303

BAROMETRIC PRESSURE (In.)

Avg. station (elev. 376 * feet, m. s. l.)	29.661	
Highest sea level	30.30	on 7th
Lowest sea level	29.70	on 20th

* Fastest observed one-minute wind speed and direction.

1/ Indicates first of more than one occurrence.

PRECIPITATION: (In.)

Total for the month	5.86	
Departure from normal	+2.46	
Greatest in 24 hours	4.40	on 11-12th
Snow, Sleet –		
Total for the month	0	
Greatest in 24 hours	0	on
Greatest depth on ground	0	on
Dates of – Hail	0	
Sleet 0 Glaze	0	

Symbols used in columns 18-19

A = Hail	L = Drizzle
BS = Blowing snow	N = Sand
DL = Distant lightning	R = Rain
D = Dust	S = Snow
E = Sleet	T = Thunderstorm
F = Fog	ZL = Freezing drizzle
H = Haze	ZR = Freezing rain
K = Smoke	

*When this elevation differs from the present station elevation this level was selected to permit comparison of data for a longer period of homogeneous record

The rain which fell on the 11th and 12th was the greatest 24 hour amount ever recorded at this station during the month of May, and was the cause of one of the biggest floods in many years along Crabtree Creek in the city of Raleigh. The low temperature of 36 degrees on the morning of the 5th was a new record low for that date.

HOURLY PRECIPITATION (In.)

Date	A. M. Hour ending at 1	2	3	4	5	6	7	8	9	10	11	12	P. M. Hour ending at 1	2	3	4	5	6	7	8	9	10	11	12	Date
1																									1
2																									2
3																									3
4	T			T	T		T	T	T	.02	.02														4
5																									5
6			T	T																					6
7																									7
8																									8
9																									9
10																									10
11							T		T	T	.02	.03	.13	.08	.23	.14	.09	.13	.10	.37	.93	1.25	.58	.25	11
12	.03	.01	.01	.02				T	T																12
13																		.01	T						13
14																					.08	.03			14
15																				.01	.03	T	T		15
16																									16
17					T	T	T																		17
18																									18
19				T	T				T																19
20	.14	.03	.01	.01										.15				T	T			T	T	.03	20
21																						T			21
22													.04	.01											22
23																									23
24																								T	24
25																.08	.12	.08	.04						25
26																		.31	.08	.03	T				26
27											.06	T													27
28																									28
29																									29
30								T		T	T	.01	.01	T			T	T	T			T	T		30
31																									31

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WBRC, Asheville, N. C. 6-1657—225

APPENDIX 14

ARCHEOLOGICAL SURVEY

THE CRABTREE CREEK INTERCEPTOR
ARCHAEOLOGICAL SURVEY

by

Eugene J. Ham

and

Jo Watson

October, 1975

Submitted to:

Archaeology Section
Division of Archives and History
Department of Cultural Resources
State of North Carolina

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Introduction

This report covers the results of an archaeological surface survey of the proposed Crabtree Creek interceptor and pump station as described in the Draft Environmental Impact Statement, EPA project C370344 (1975). The interceptor is 20.1 miles long. The pump station will encompass 38,000 square feet. The interceptor right-of-way is defined as being 50 to 33 feet in width (Ibid., Sec. d, p.87). Two archaeologists, Eugene J. Ham and Jo Watson, were contracted to conduct the surface survey under a contract drawn between Peirson & Whitman, Inc., Raleigh, N.C. and the Division of Archives and History, Archaeology Section. In 1971 and 1972 the interceptor corridor was mapped under six survey contracts. These maps can be obtained from Peirson & Whitman, Inc., Raleigh, N.C.

Two weeks, September 15 through October 1, 1975 were taken to conduct the fieldwork involved in the archaeological survey. Twelve sites were located as well as eleven occurrences of lithic debitage (see Figure I). Sites were designated in order of their discovery with the prefix "CCI" (Crabtree Creek Interceptor) identifying the project under which the sites were found. The location of sites is given in feet from the nearest permanent feature and is referenced to the nearest station and contract number. Primary impact by the Crabtree Creek interceptor, as proposed, would occur at three sites; i.e., CCI.2, CCI.7, and CCI.11.

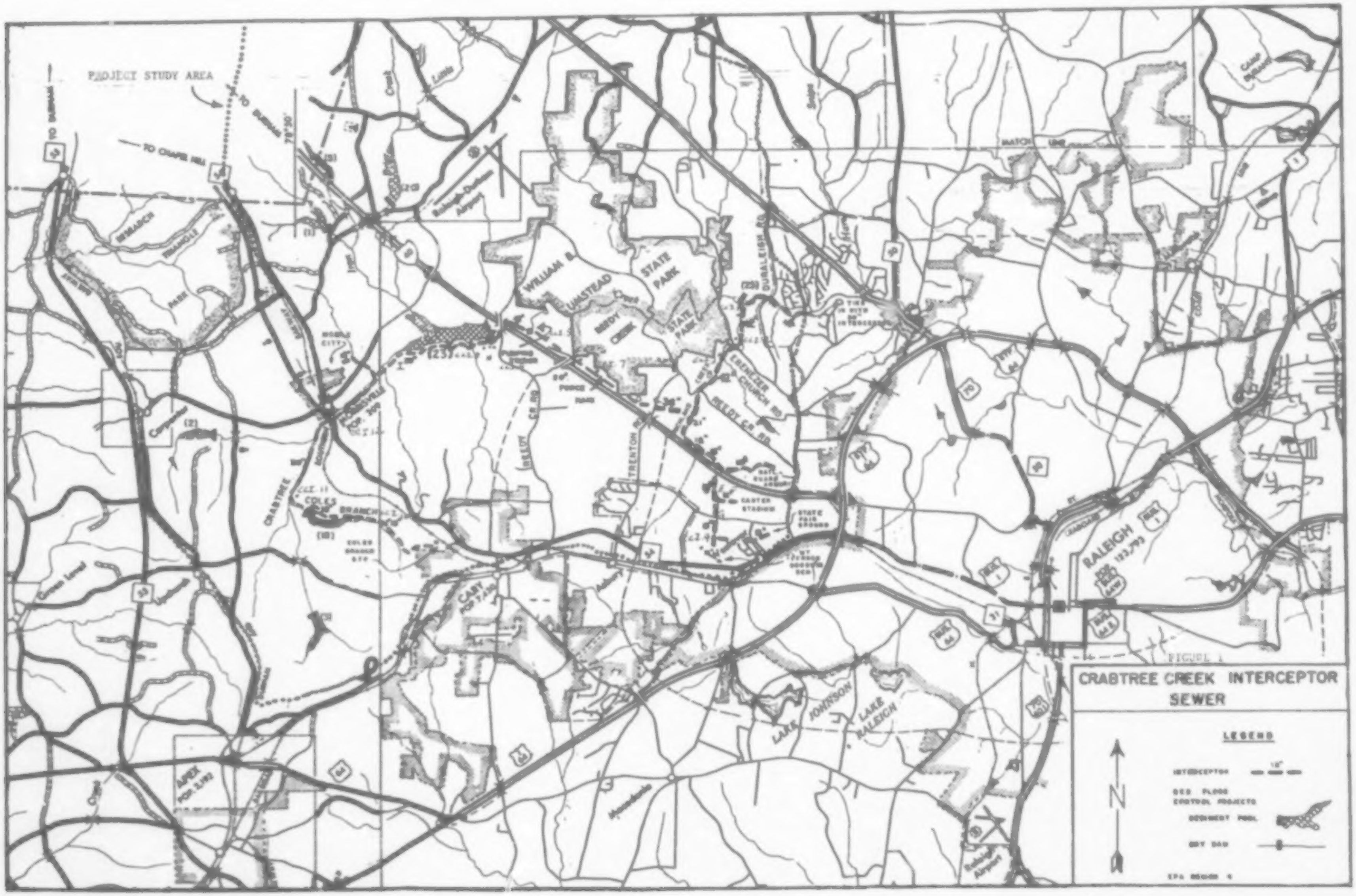


FIGURE 1

CRABTREE CREEK INTERCEPTOR SEWER

LEGEND

INTERCEPTOR — 12" —

SCS FLOOD CONTROL PROJECTS

SEDIMENT POOL

DRY DAM

EPA REGION 4

Method

The survey involved the surface reconnaissance of a 60 foot wide corridor to locate any archaeological or historical artifacts or structures that would potentially be impacted by construction and maintenance of the Crabtree Creek interceptor. Roughly 90% of the survey line was situated in forests and floodplains where the leaf cover was up to 6 inches thick. Trowels and hand shovels were used to expose the surface soil. Generally the soil was turned up to a depth of 3 inches in order to examine a greater surface area. A second method used on the survey was to sample locations where cultural material was uncovered to define sites and their relationship to the interceptor. The sampling procedure, hereafter referred to as bucket sampling, involved taking samples at measured intervals on and off the interceptor. Enough soil was taken to fill a ten-quart bucket. The bucket sample was then sifted through 1/4 inch screen mesh and the artifacts removed. This procedure required a lensatic compass, measuring tape, hand shovel, ten-quart capacity bucket, and 1/4 inch screen mesh.

Finally, a preliminary cataloging of artifacts recovered was undertaken to determine the cultural affinity, and significance of the site.

Environment

The Draft Environmental Impact Statement (Ibid.) includes a detailed discussion of the environment. Further, Dr. J. Stucky is presently conducting a botanical survey of the Crabtree Creek interceptor. The following deals with the major environmental factors that influenced the survey.

The CCI runs through two basic topographic features. Roughly 60% of the interceptor is located on floodplains. The greatest width of the floodplains is 2000 feet and the average width is 60 - 100 feet. The floodplains border small creeks and intermittent streams. The uplands consist of steep slopes on large hills. Slope wash erosion is evident.

The vegetation along the interceptor is secondary forest and pasture. the predominant forest character is mixed pine and hardwood, though occasional pine tree stands occur.

Floodplain soils are silty loams with a high clay content and appear to be relatively young. Forest soils are sandy loams.

Gneiss and granite are the dominant rock types underlying the eastern half of the interceptor survey line. The west half is underlain by Triassic sediments. Throughout the survey area, the most abundant material was quartz in the form of outcrops, veins, and cobbles.

CCI.1

Location

The site is located 2,680 feet north of the State Route 1849 (Ebenezer Church Road) bridge over Richland Creek, and 2,230 feet north of CCI.2. The north edge of the site is approximately 535 feet south of station 76+ $26^{\underline{40}}$, contract IV, at the south fence line of Wake Academy.

Description

CCI.1 is situated on the floodplain of Richland Creek. The floodplain is currently used as a pasture. There is evidence that the floodplain has been covered with at least 3 to 6 inches of red clay mixed with gravel with resultant flattening of the relief. The limits of the site are irregular. The densest area of cultural material is 33 feet by 15 feet (see Figure II).

Sampling Procedure and Results

Surface reconnaissance of the floodplain exposed scattered quartz and rhyolite debitage, within 40 feet of the proposed interceptor. Subsequently, ten bucket samples were taken across a portion of the floodplain to determine the boundaries and intensity of the site (see Figure II). The results of the 10 samples coincided with surface observations that a small localized occurrence of pottery and debitage occurred 15 feet from the creek bank (see Figure II and Appendix).

Significance

The only diagnostic material is three small potsherds, all grit-tempered,

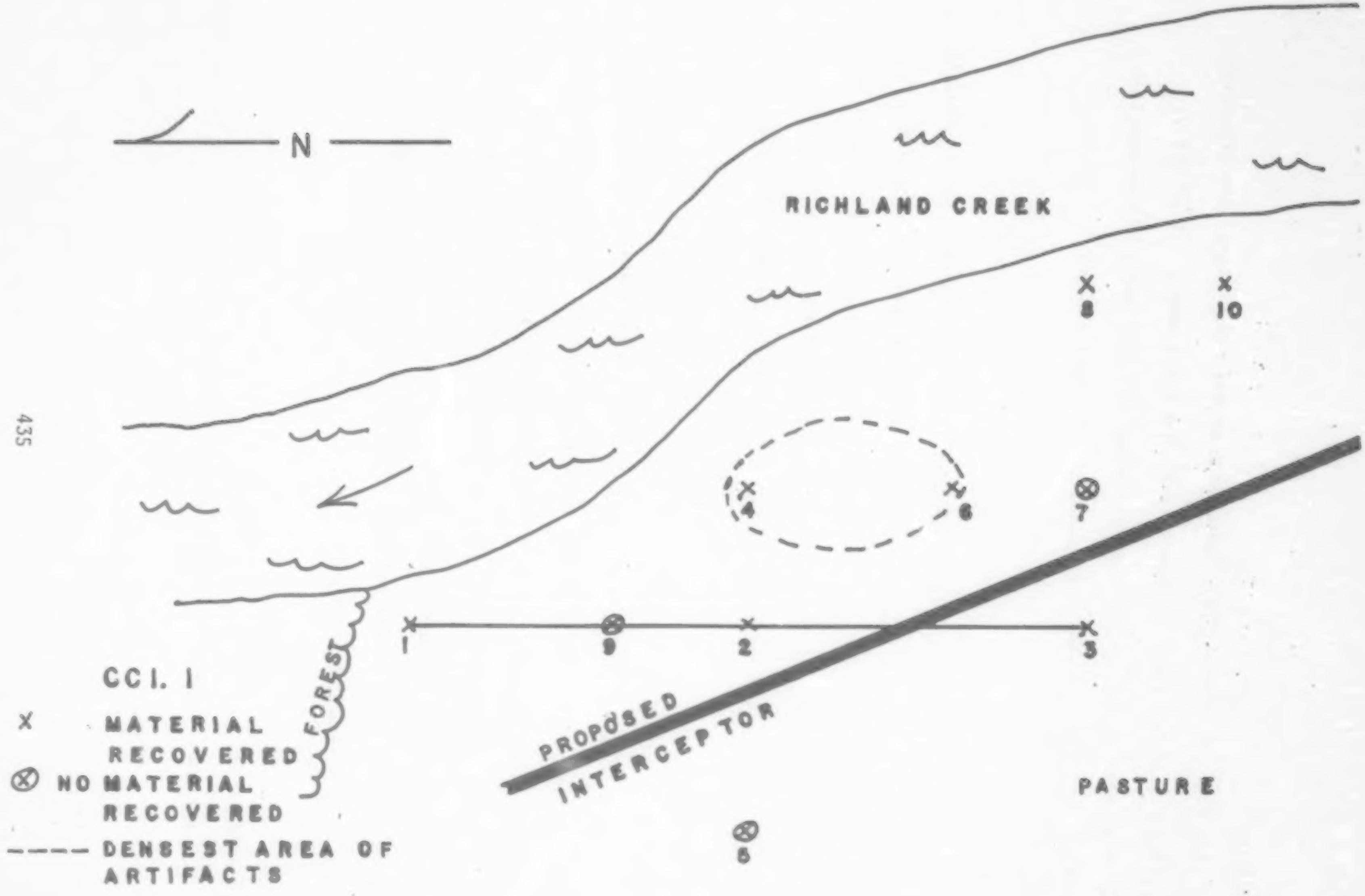

N
RICHLAND CREEK
FOREST
PASTURE
PROPOSED INTERCEPTOR
1
2
3
4
5
6
7
8
9
10
CCI. I
X MATERIAL RECOVERED
⊗ NO MATERIAL RECOVERED
---- DENSEST AREA OF ARTIFACTS
SCALE: 1 inch = 20 feet

FIGURE II

two cord-marked and one net-impressed. The pottery indicates a Woodland occupation. The lack of any evident organization in CCI.1 suggests transportation of cultural material during the land-fill operation, noted in the description of the site, probably from a broad high knoll overlooking the floodplain.

Impact Mitigation and Alternatives

Due to the disturbed nature of CCI.1, no impact is anticipated on the site. However, care should be exercised not to exceed the 40 foot right-of-way, particularly on the west side of the interceptor.

CCI.2

Location

Site CCI.2 lies 290 feet northeast of State Route 1849 (Ebenezer Church Road) where it crosses Richland Creek. It is 190 feet northeast of Control Point #37, contract IV.

Description (see Figure III)

CCI.2 is located above the floodplain of Richland Creek. It is set against a slope in an immature forest of mixed hardwood and pine.

The site is an old mill. The extant features of it include a fieldstone foundation, a mill race with low stone walls and an out flow channel. A 1930's C.C.C. project has modified a portion of the mill race area.

Sampling Procedure and Results

Surface reconnaissance was conducted at this site. Measurements were made of the extant structural features (see Figure III), and debris was noted but not collected. Fallen wooden beams with machine-cut and wire nails, tin roofing, window glass and rusting iron containers were scattered over the area. A cogged iron wheel, 5.8 feet in diameter rested on top of two of the fieldstone walls.

Significance

This mill is probably one of the thirty-odd mills operating in the western part of Wake County during the post-Civil War period. Its foundation and parts of the machinery appear to be in good condition. The significance of this mill to local history will require further reserach.

Impact Mitigation and Alternatives

The proposed interceptor will have a primary impact upon two areas of this site - those portions of the mill race and out flow channel which will be cut by the interceptor. Profiles should be drawn in both these areas. Testing should be carried out east of the mill race area to determine what effect the proposed line will have on the stone wall structure.

The mill structure itself will be secondarily impacted. If the proposed greenway plan (Ibid., p.89) goes into effect the mill will be opened to public access and potential vandalism. This site could become an important educational feature of the proposed greenway system. Archival research should be done to determine its historical significance and original appearance. Further recommendations should be based on these findings.

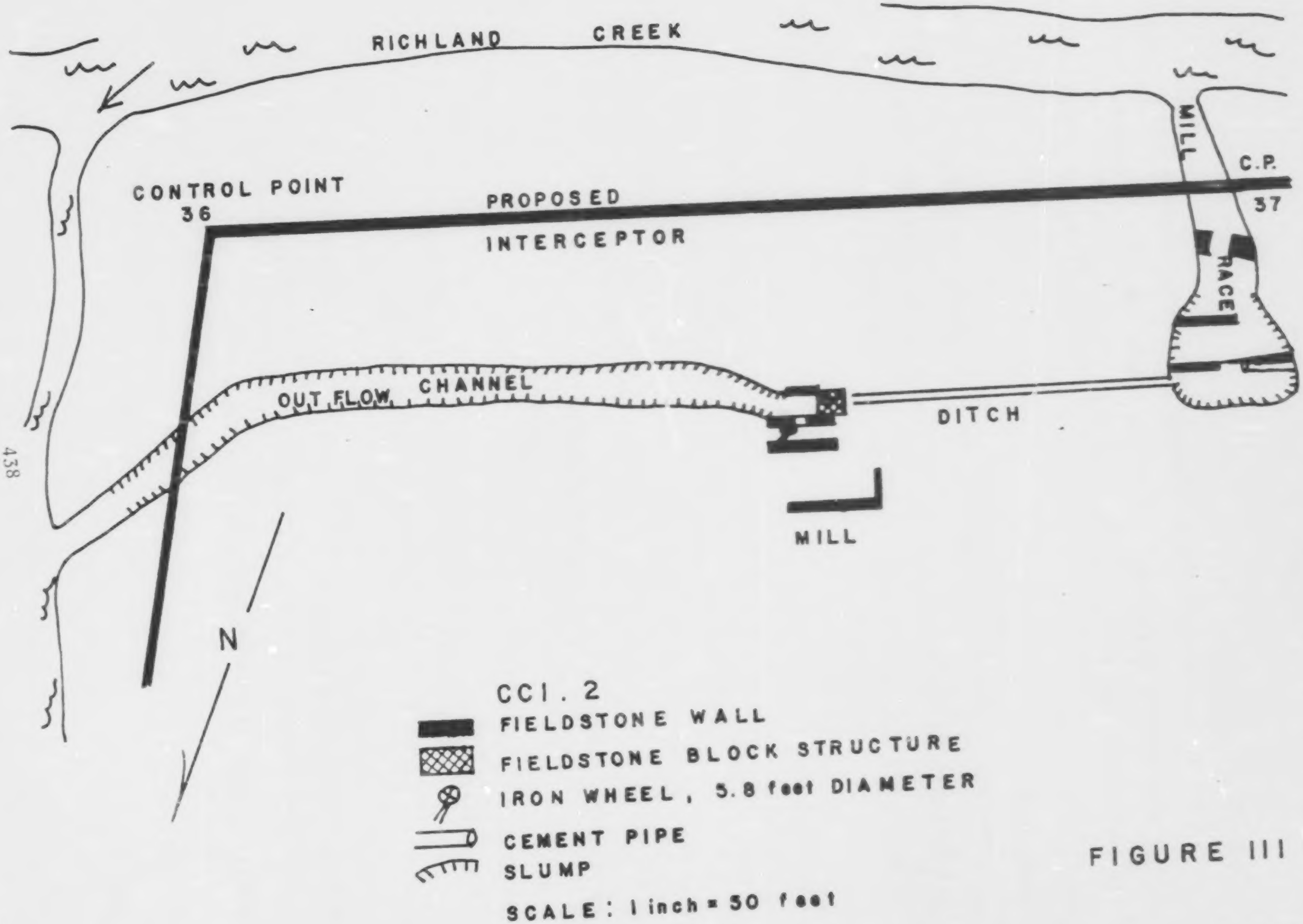

RICHLAND CREEK
MILL
C.P.
37
RACE
CONTROL POINT
36
PROPOSED
INTERCEPTOR
OUT FLOW CHANNEL
DITCH
MILL
N
CCI. 2
FIELDSTONE WALL
FIELDSTONE BLOCK STRUCTURE
IRON WHEEL, 5.8 feet DIAMETER
CEMENT PIPE
SLUMP
SCALE: 1 inch = 50 feet

FIGURE III

CCI.3

Location

CCI.3 is located 2,380 feet west of State Route 1849 (Ebenezer Church Road) approximately 65 feet north of Richland Creek. The site is bordered by Control Point #46 through Control Point #49, contract IV.

Description

The site is situated on a low level knoll overlooking the Richland Creek floodplain. It is approximately 285 feet above sea level. The area is characterized by mixed hardwood and pine forest vegetation.

Sampling Procedure and Results

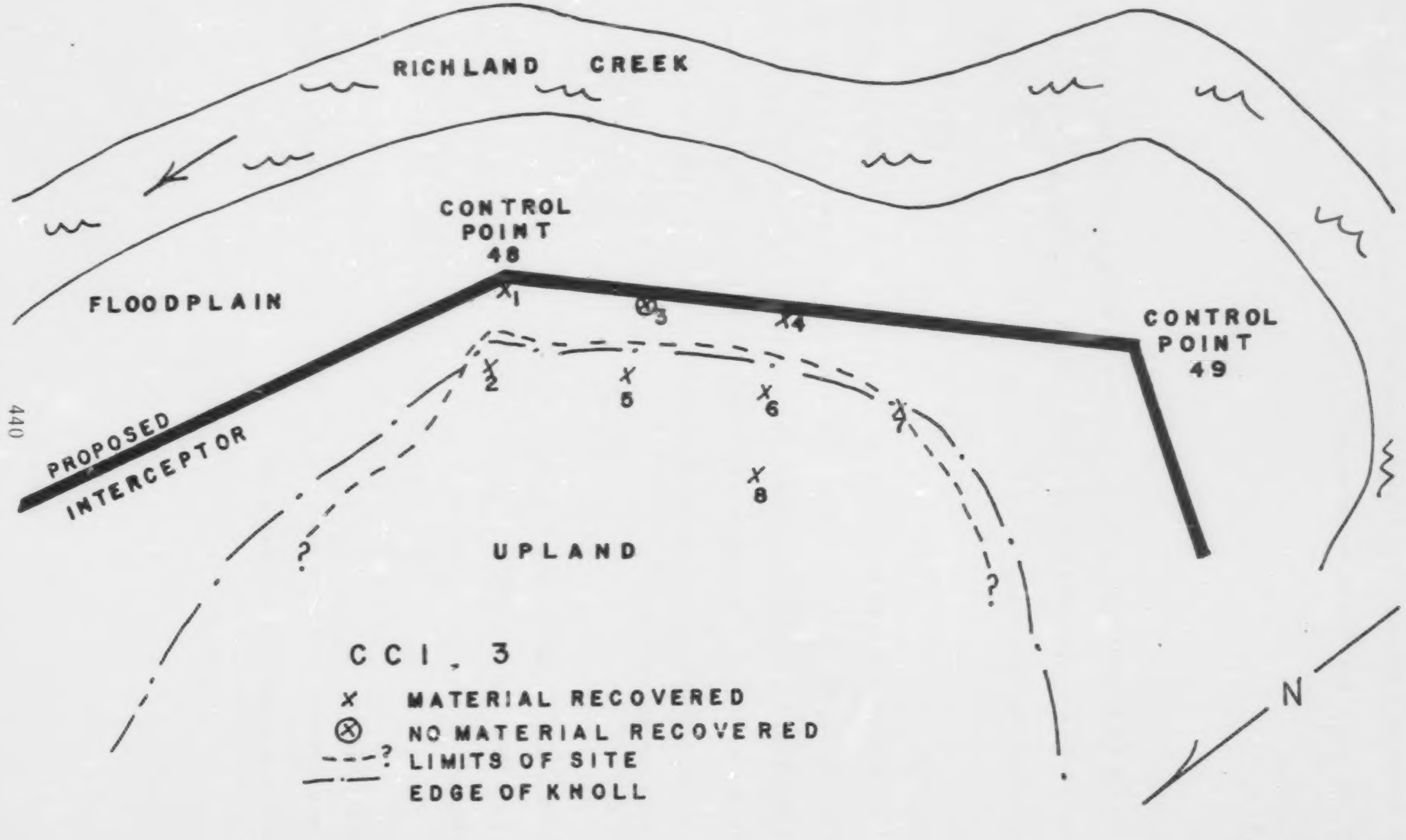
Initially a surface collection of the area resulted in the recovery of quartz debitage and one tool. Subsequently, the bucket sampling procedure was instituted. Eight samples were taken at CCI.3. The results of the bucket sampling indicate that the focus of cultural material is restricted to the knoll (see Figure IV and Appendix).

Significance

A potentially significant ceramic period occupation is suggested by the material collected and its distribution over the knoll.

Impact Mitigation and Alternatives

No primary impact on CCI.3 is foreseen. The interceptor right-of-way lies within the floodplain which defines the eastern limits of the site.



SCALE: 1 inch = 50 feet

FIGURE IV

Care should be exercised not to exceed the 40 foot right-of-way, particularly on the west side of the interceptor.

CCI.4

Location

CCI.4 is located approximately 800 feet from the north border of Mt. Vernon School and approximately 800 feet from an intermittent stream that is overlooked by the site.

Description

The site is situated on the top of a hill that overlooks an intermittent stream flowing into Richland Creek. The area is a tree farm that has been harvested within the last six months, destroying all evidence of the interceptor survey line. This made it impossible to determine the exact location of the interceptor. It is estimated that the site is more than 150 feet from the interceptor.

Sampling Procedure and Results

A surface reconnaissance of the area was carried out, resulting in the recovery of one stone tool.

Significance

No diagnostic artifacts were found. Based on present data no temporal affinity can be ascribed to this site.

Impact Mitigation and Alternatives

No impact by the interceptor is anticipated for this site. Reconstruction of the interceptor survey line suggests the site will not be affected by pipeline excavation and maintenance.

CCI.5

Location

CCI.5 is located 1,480 feet northwest of the end of the existing access road that begins at State Route 1654, just north of the north exit onto I-40. The William Umstead State Park gate is at station 2+95, contracts I and II.

Description

CCI.5 is situated on the side of a steep hill overlooking the Crabtree Creek floodplain and proposed Crabtree Creek interceptor pump station. The area is covered by a mixed hardwood and pine forest.

Sampling Procedure and Results

Surface reconnaissance indicated that cultural material was present. Nine bucket samples were taken at this site (see Figure V). Results of the bucket sampling include quartz debitage and bifaces (see Appendix). Material recovered was restricted to a steep hillside.

Significance

No diagnostic artifacts were recovered and the steep hillside exhibits

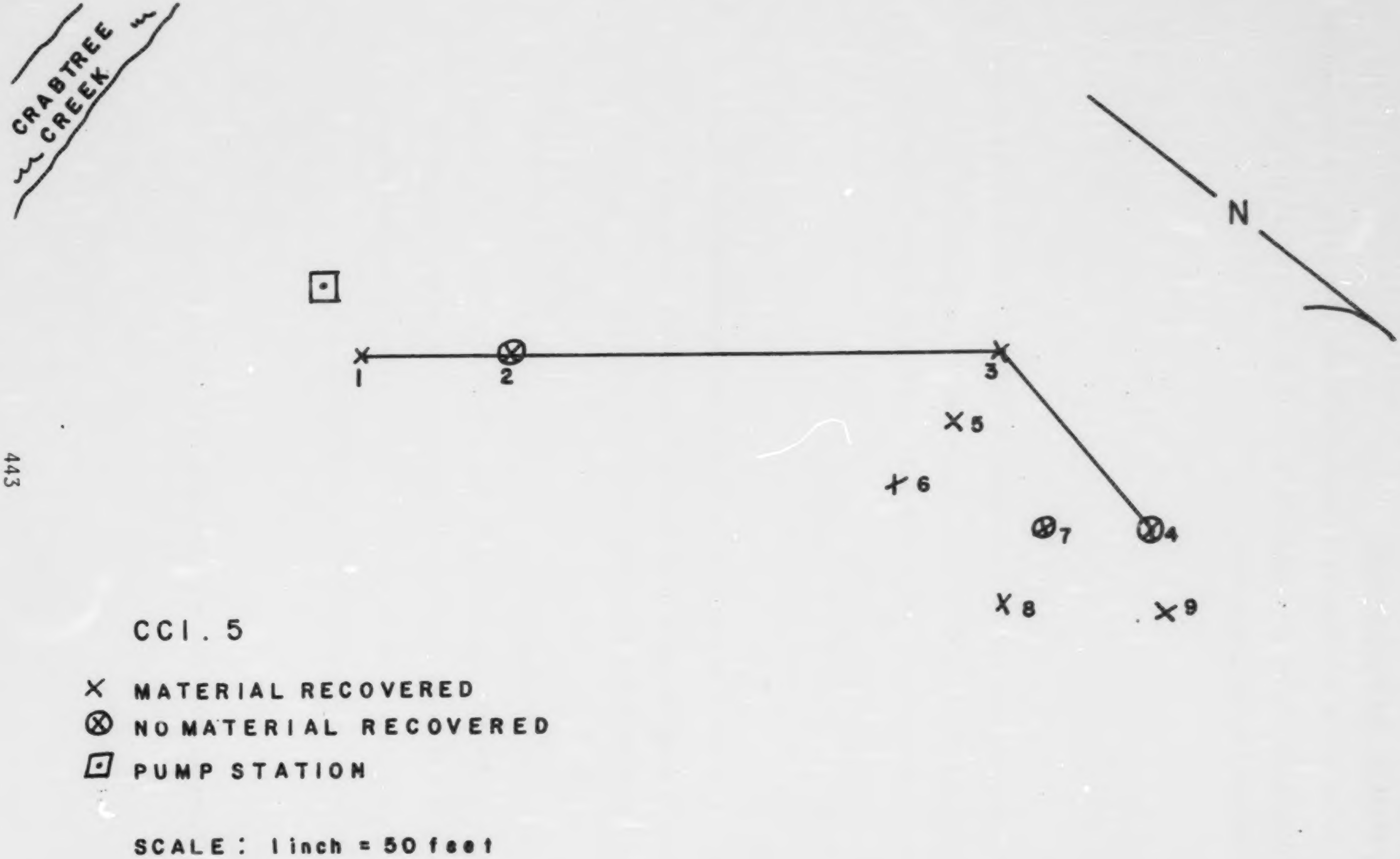

CRABTREE CREEK
N
1
2
3
5
6
7
4
8
9
CCI. 5
× MATERIAL RECOVERED
⊗ NO MATERIAL RECOVERED
⊡ PUMP STATION
SCALE: 1 inch = 50 feet

FIGURE V

extensive slope erosion. No significant organization is present at CCI.5.

Impact Mitigation and Alternatives

No impact is anticipated at this site.

CCI.6

Location

Site CCI.6 is located 700 feet southeast of State Route 1654 (Reedy Creek Road) at the entrance gate to Reedy Creek State Park. It is 30 feet northwest of station 58+00, contract III.

Description

This site appears to be the remains of a springhouse. A two foot square concrete reservoir surrounds the head of an active spring bounded on three sides by a narrow stone wall. The area enclosed is 15 feet by 15 feet. It is located at the base of a steep hill. The site lies within a mixed hardwood and pine forest.

Sampling Procedure and Results

Surface reconnaissance was carried out. At various points around the structure the ground was exposed and examined for artifacts and structural features. An iron wheel hub, barrel hoops, and a mason jar were among the debris observed.

Significance

This site is not significant.

Impact Mitigation and Alternatives

There will be no primary impact on this site. However, care should be exercised not to exceed the 40 foot right-of-way, particularly on the north side of the interceptor.

CCI.7

Location

CCI.7 is located approximately 2800 feet southeast of State Route 1654 (Reedy Creek Road) where it enters William Umstead State Park, Reedy Creek Section. The southern end of the structure lies 80 feet northwest of station 77+46$\overset{4}{-}$, contract III.

Description

CCI.7 is located in a mature hardwood forest. A fieldstone structure is bisected by Reedy Creek.

Features of CCI.7 include two large fieldstone wall segments, a long ditch running from the northern wall down to the creek, and two smaller stone walls. A mass of tumbled stone extends from the northern wall along the edge of the creek (see Figure VI).

Sampling Procedure and Results

Surface reconnaissance was carried out at this site. The structure was measured and existing features were noted. A cast iron wheel was found on the southern bank of the creek below the stone wall.

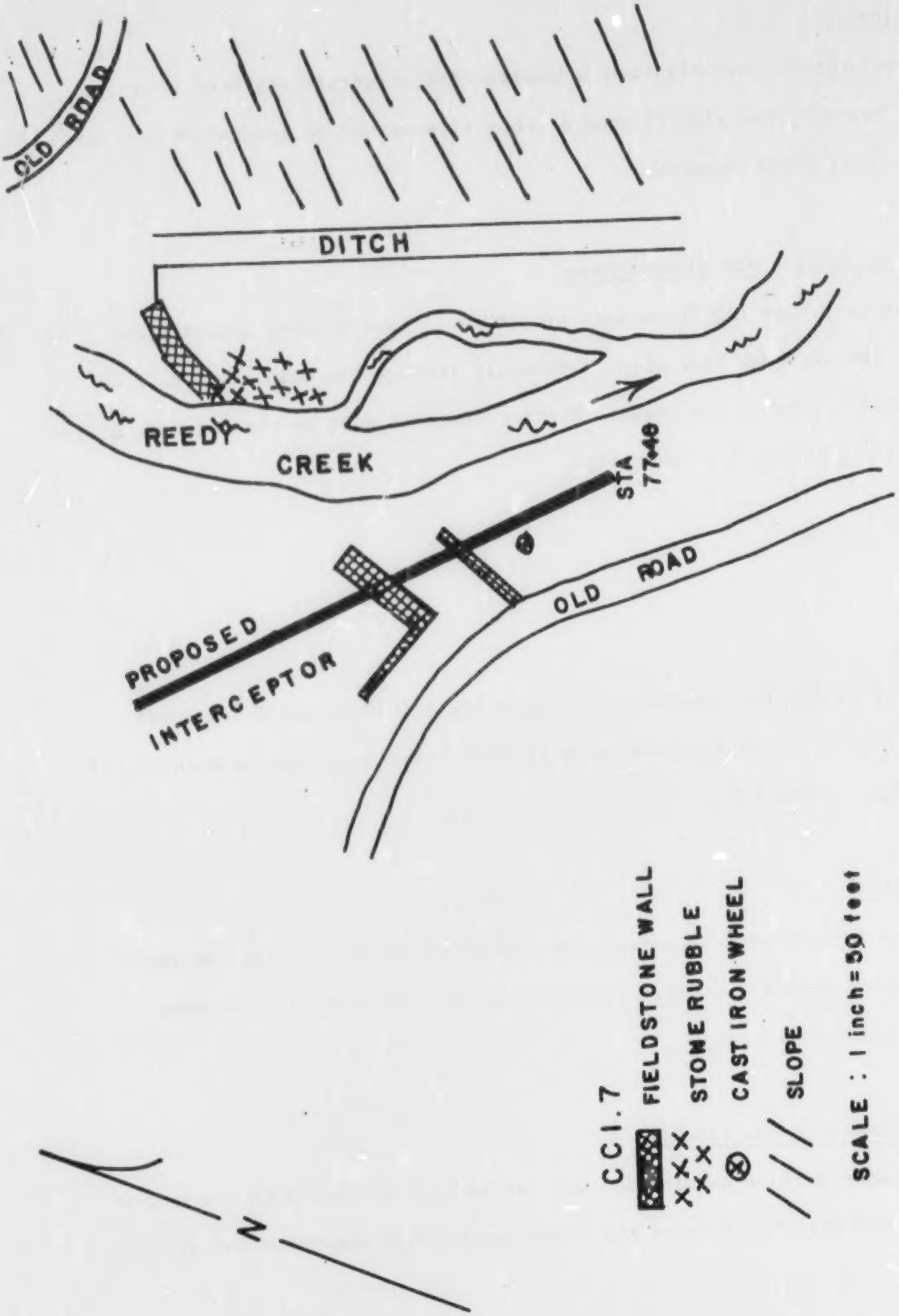

OLD ROAD
DITCH
REEDY
CREEK
STA 77+48
OLD ROAD
PROPOSED
INTERCEPTOR
CCI.7
FIELDSTONE WALL
STONE RUBBLE
CAST IRON WHEEL
SLOPE
SCALE : 1 inch=50 feet
N

FIGURE VI

Significance

Preliminary investigation indicates this structure may have been a mill. However, the significance of this site cannot be determined without further historical research.

Impact Mitigation and Alternatives

The intercept and force main project will have primary impact upon CCI.7. The proposed line will go directly through the main stone wall on the southern side of the creek. Further research must be conducted to determine the significance of this site.

CCI.8

Location

CCI.8 is 800 feet southwest of State Route 1650 (Reedy Creek Road) where it crosses Crabtree Creek west of I-40. The site lies between MH #25 and MH #26, contract VI.

Description

CCI.8 is located in a mature mixed hardwood and pine forest on the south side of Crabtree Creek. The area has been extensively disturbed by heavy machinery.

Sampling Procedure and Results

Extensive surface examination was carried out at this site. A number of quartz and rhyolite bifaces and flakes were found scattered throughout the area (see Appendix). No temporal affinity could be assigned to CCI.8 as no diagnostic artifacts were recovered.

Significance

Due to construction activities in the area by a Soil Conservation Service dam project most of the ground cover has been removed. Erosion has been severe. It is doubtful that much information in this site can be salvaged. It can therefore no longer be considered significant.

Impact Mitigation and Alternatives

No primary or secondary impact is relevant to this site based on its disturbed condition.

CCI.9

Location

CCI.9 is 1,520 feet west of the State Route 1650 (Reedy Creek Road) bridge over Crabtree Creek, west of I-40. A Soil Conservation Service dam survey baseline is 300 feet east of the site. The site is bordered by the interceptor from 100 feet east of MH #27, to MH #27 to 70 feet north of MH #28, contract VI.

Description

CCI.9 is on a rise above the floodplain on the south side of Crabtree Creek. The dominant vegetation is immature pine trees and tall grasses. To the east of the interceptor is a plateau 3 to 5 feet higher than the upper limit of the floodplain. The soils on the plateau suggest that they were artificially transported.

Sampling Procedure and Results

Cultural material was first observed during the standard surface reconnaissance of the interceptor right-of-way. Subsequently, 13 bucket samples were taken along the interceptor and plateau (see Figure VII).

Results of the sampling procedure do not indicate any clear structure to the site. Quartz and rhyolite debitage are most frequent on the west side of the site (see Appendix). Sampling on the plateau revealed that the soil there was carried in as fill. Accordingly, the major portion of the site may be covered at the present time.

Significance

The temporal affinity of CCI.9 cannot be determined based on the available data. The proximity of CCI.8 to the plateau on CCI.9 (500 feet) suggests that CCI.9 may be a remaining portion of a quarry site overlooking Crabtree Creek.

Impact Mitigation and Alternatives

No direct impact to CCI.9 is anticipated by the Crabtree Creek interceptor. Care should be exercised not to exceed the 40 foot right-of-way, particularly on the southeastern side of the interceptor.

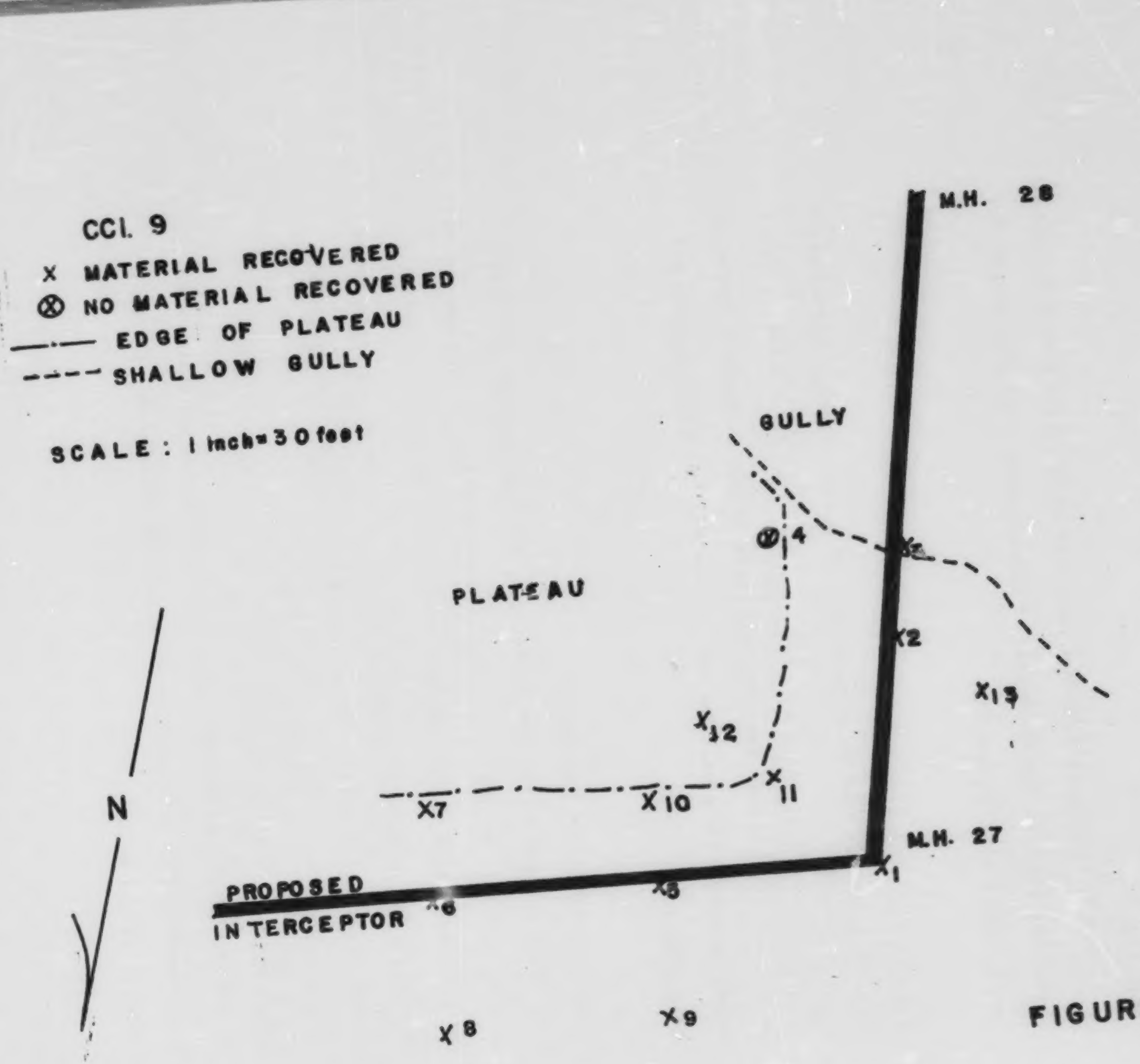

CCI. 9
X MATERIAL RECOVERED
⊗ NO MATERIAL RECOVERED
—·— EDGE OF PLATEAU
- - - - SHALLOW GULLY
SCALE : 1 inch = 30 feet
M.H. 28
M.H. 27
GULLY
PLATEAU
PROPOSED INTERCEPTOR
N
X1
X2
X3
4
X5
X6
X7
X8
X9
X10
X11
X12
X13

FIGURE VII

CCI.10

Location

CCI.10 is located 2000 feet northwest of the Coles Branch wastewater treatment plant on the north side of Coles Branch. The site is 130 feet west of MH #126, contract VI.

Description

This site is restricted to an area of quartz outcrops approximately 40 feet by 15 feet. It lies on a low plateau just above a narrow floodplain of Coles Branch. The site is located within an immature forest of mixed hardwoods and pine. The area surrounding the quartz outcrop has been plowed.

Sampling Procedure and Results

After routine surface reconnaissance, 7 bucket samples were taken at this site (see Figure VIII). Bucket samples along the pipeline and on the plateau outside of the immediate vicinity of the outcrops yielded little cultural material. Surface examination of the outcrop area showed several crude quartz bifaces, flakes and possible cores (see Appendix).

Significance

Because of the restricted nature of this site and the disturbance to the surrounding area it appears to be of minimal significance to the prehistory of the area.

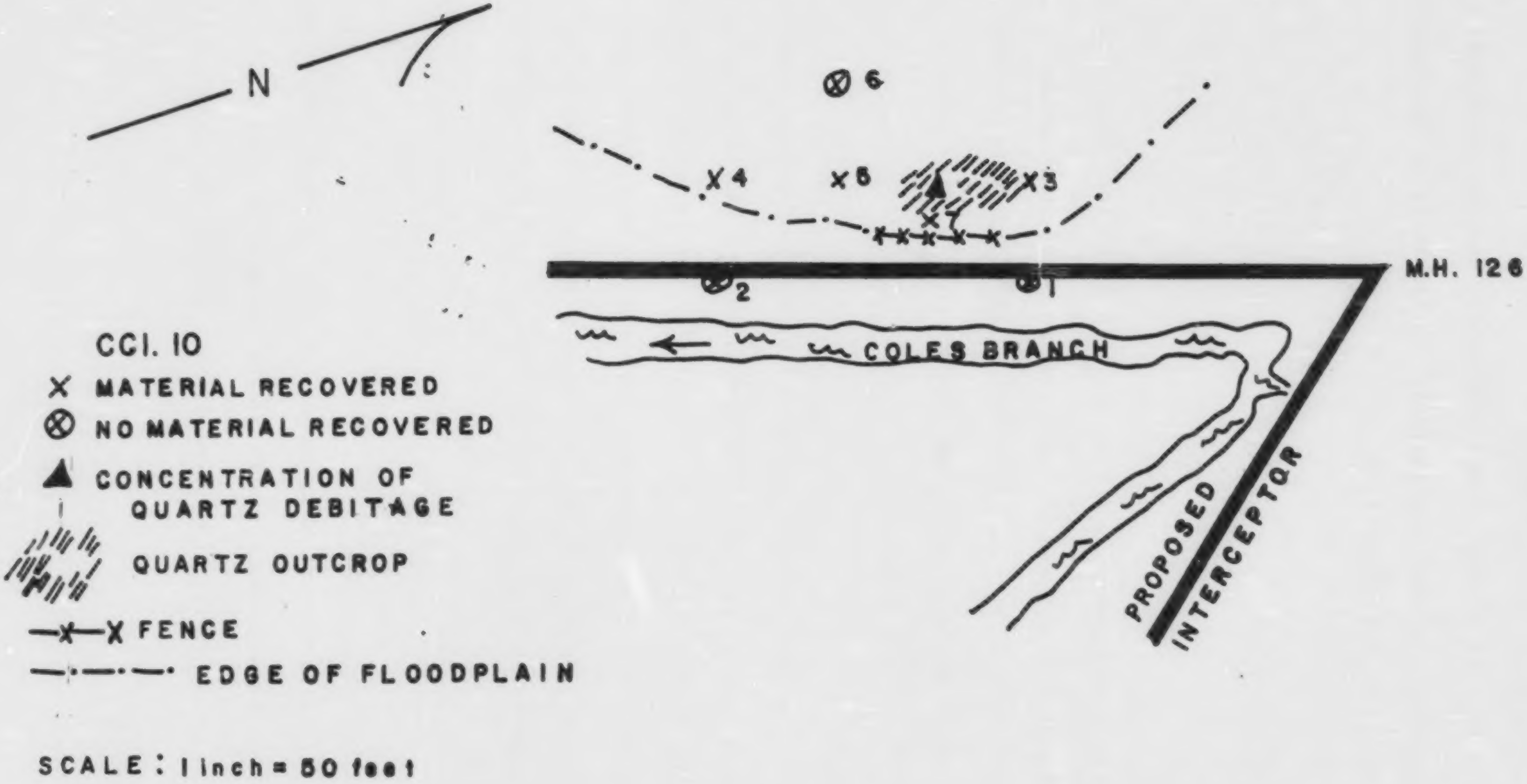

N
⊗ 6
X 4
X 5
X 3
⊗ 2
⊗ 1
M.H. 126
COLES BRANCH
PROPOSED INTERCEPTOR
CCI. 10
X MATERIAL RECOVERED
⊗ NO MATERIAL RECOVERED
▲ CONCENTRATION OF QUARTZ DEBITAGE
QUARTZ OUTCROP
—X—X FENCE
—·—·— EDGE OF FLOODPLAIN
SCALE: 1 inch = 50 feet

FIGURE VIII

Impact Mitigation and Alternatives

There will be no impact upon this site. However, care should be taken not to exceed the 40 foot right-of-way, particularly on the western side of the proposed interceptor line.

CCI.11

Location

The site is located in a cleared field 5,280 feet west of State Route 1613 off a dirt road which is 1,056 feet south of State Route 1002. The interceptor crosses the site from station 320+00 heading southwest to MH #99 where it turns due west across the field.

Description

CCI.11 is restricted to a rise approximately 320 feet above sea level. The western half of the site is a corn field that was recently harvested. The eastern half of the site is a mixed pine and hardwood forest (see Figure IX). On the southeastern border of the site is Coles Branch which empties into Crabtree Creek at the far end of the corn field. The dimensions of the site appear to be related to its location on a rise overlooking Coles Branch and its confluence with Crabtree Creek.

Sampling Procedure and Results

Artifacts were first observed in the cleared field. Chippage, potsherds, one side-notched serrated quartzite point and two quartz tools were recovered. Subsequently, 9 bucket samples were taken. Results of the 9 samples and the surface collection (see Appendix) indicate that cultural material is thinly scattered on the surface along the interceptor right-of-way. The surface collection points to two areas with possible subsurface cultural features (see Figure IX). The first area is marked by rhyolite and quartz debitage and rhyolite and quartz tools. This location is near Coles Branch. The second area is roughly 30 to 60 feet from MH #99 where the quartzite point, tools, and potsherds were recovered.

Significance

CCI.11 is a multi-component prehistoric site. The earliest component is indicated by a quartzite, serrated side-notched projectile point. The straight stem and blade to stem proportions suggest that it is a Late Archaic Savannah River variant as illustrated by Coe (1964, p.110, Fig. 106). However, a major portion of the base is missing so that positive identification cannot be made. The second component is represented by several small potsherds. The pottery sample is too small for typological identification. All are grit-tempered and the surface treatment is plain on two sherds and net-impressed on one sherd.

Impact Mitigation and Alternatives

Surface examination of the site indicates that the interceptor will cross CCI.11. Primary impact on the site would occur if the present plan for the interceptor is followed. A major activity focus of the prehistoric occupation will be disturbed, located just south of MH #99.

There are two alternatives to impact on CCI.11. First is a rerouting of the interceptor, north of its proposed location. Second, a program

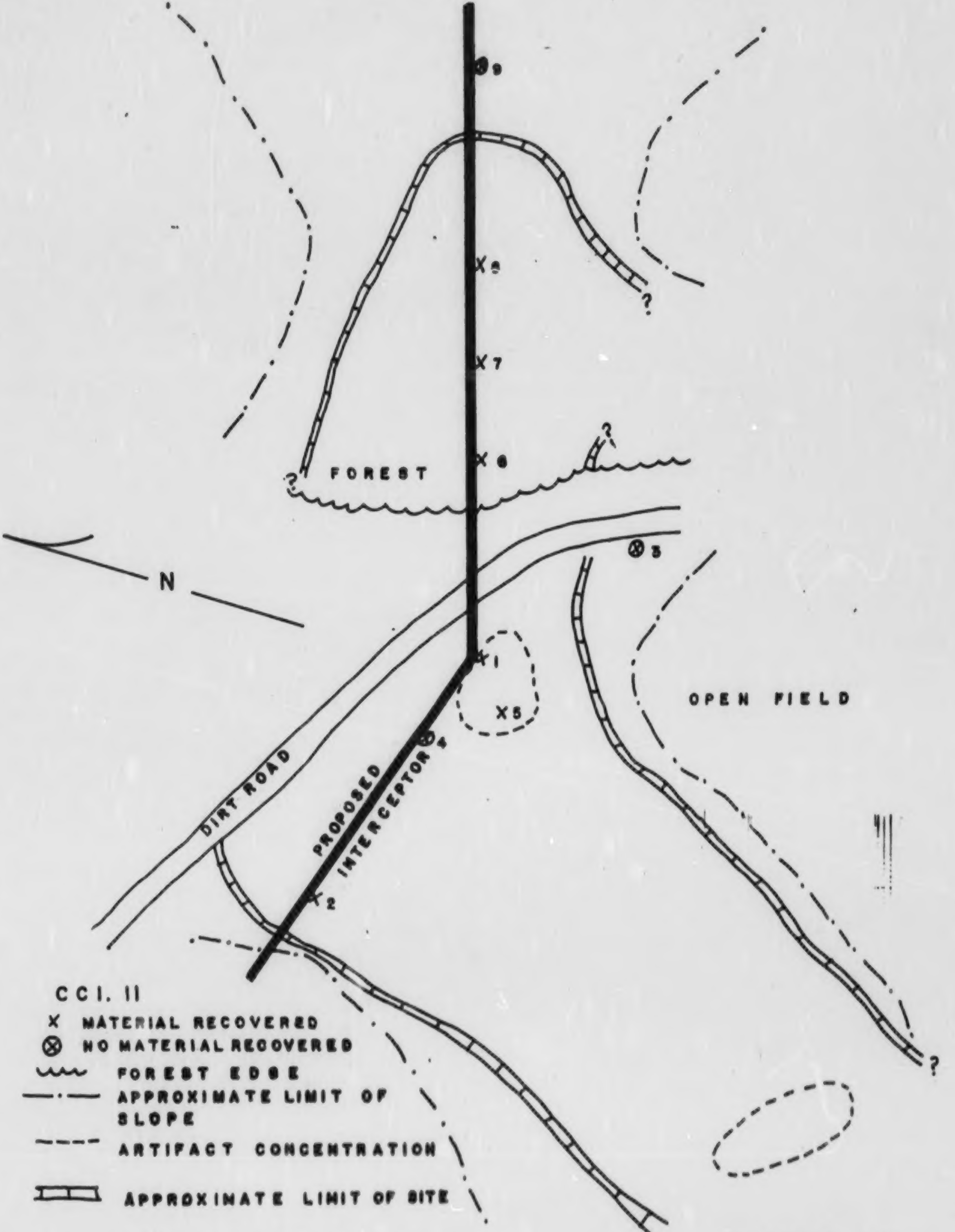

⊗ 9
X 8
X 7
X 6
?
?
FOREST
?
N
⊗ 3
X 1
X 5
⊗ 4
OPEN FIELD
DIRT ROAD
PROPOSED INTERCEPTOR
X 2
?
?
CCI. 11
X MATERIAL RECOVERED
⊗ NO MATERIAL RECOVERED
FOREST EDGE
APPROXIMATE LIMIT OF SLOPE
ARTIFACT CONCENTRATION
APPROXIMATE LIMIT OF SITE
SCALE: 1 inch = 50 feet

FIGURE IX

of testing could be initiated for two areas - near MH #99 and in the forest on the eastern end of CCI.11.

CCI.12

Location

CCI.12 is located approximately 1000 feet east of N.C. Highway 54, 700 feet south of the Crabtree Creek bridge. The site is near MH #78, contract VI.

Description

CCI.12 is situated in a cultivated field. Presently, the corn stands 8 feet high. The site is located on the side of a rise running south into a mixed pine and hardwood forest.

Sampling Procedure and Results

The field in which the site was discovered has been cultivated for the past year so that any traces of the Crabtree Creek interceptor survey line have been destroyed. Reconstruction of the survey line by hand compass aided in conducting a surface reconnaissance. Several rhyolite flakes were observed. The distal portion of a projectile point was recovered.

Significance

Based on material recovered, the temporal affinity of this site cannot be determined. In addition, the scattered debitage associated with this site is suspected of having been transported down slope.

Impact Mitigation and Alternatives

No impact on this site is anticipated. Care should be exercised not to exceed the 40 foot right-of-way in this area.

Archaeological Perspective of Survey

The cultural history of Wake County is little understood. However, in the perspective of the Carolina Piedmont, the results of the Crabtree Creek Interceptor survey are applicable to the prehistoric cultural chronology developed by Coe (1964). The results of this chronology have been gathered from excavations, in which stratified cultural remains have been identified. Different periods have been defined on the basis of the association of diagnostic artifacts, carbon-14 dates and the stratigraphic position of the cultural material. Diagnostic artifacts traditionally include projectile points, ceramics and other lithic material. The Paleo-Indian period, 10,000 BC to 8,000 BC, is characterized by fluted projectile points and an absence of pottery. During this time the cultural occupations were generally small and reflected generalized hunting and gathering subsistence patterns. The succeeding period is the Archaic, ca. 8,000 BC to 500 BC. During this period there was a shift toward specialized hunting and gathering. Diagnostic artifacts range from notched projectile points to stemmed projectile points and the appearance of ground stone tools and shell middens. Again, there is an absence of pottery. The settlement pattern of the Archaic is nomadic with a preference for riverine resources. The Woodland period, ca. 500 BC to 1700 AD is primarily defined by the presence of pottery. During this period prehistoric cultures became increasingly sedentary, their social organization became increasingly stratified and their subsistence was marked by the development of incipient agriculture. Their settlement pattern is characteristically sedentary with permanent village sites usually located on broad knolls overlooking rivers. During the later Woodland period warfare becomes endemic and confederacies develop.

CCI.1 and CCI.3 represent Woodland period cultural occupations. CCI.11 is a multi-component prehistoric site ranging from the Archaic period to the Woodland period.

Summary

Twelve archaeological sites were excavated during the survey. Seven sites were found to be not significant or their significance was unknown (Table I). This was due either to their disturbed condition (CCI.1, CCI.5, CCI.8, CCI.10 and CCI.12), their distance from the proposed interceptor (CCI.4, CCI.9) or their recent temporal affinity (CCI.6). CCI.3 was found to be a potentially valuable Woodland period occupation. However, it will not be directly impacted by the interceptor.

At three sites, (CCI.2, CCI.7, and CCI.11), the significance was not determined due to the lack of sufficient information available and insufficient data recovered. CCI.2 and CCI.7 are field stone structures. CCI.2 is a post-Civil War mill structure. The state of preservation of the mill structure and associated features, such as the mill race and out flow channel, indicate that a significant amount of information can be recovered. CCI.7 is suspected of being a mill. Its significance cannot be fully assessed based on the present information. CCI.11 is a large prehistoric and multi-component site. Little information is known concerning the prehistory of Wake County.

This site could contribute much needed data concerning the cultural history of this area. Table I lists the twelve sites identified as to their temporal affinity (if known), their significance and the recommended mitigation.

Table I. Temporal Affinity and Significance of Sites Identified

	Period	Not Significant	Significance Unknown	Testing Recommended
CCI.1	Woodland	X		
CCI.2	post-Civil War		X	X
CCI.3	Woodland	X		
CCI.4	Prehistoric, unknown	X		
CCI.5	Prehistoric, unknown	X		
CCI.6	1930's	X		
CCI.7	post-Civil War		X	X
CCI.8	Prehistoric, unknown	X		
CCI.9	Prehistoric, unknown	X		
CCI.10	Prehistoric, unknown	X		
CCI.11	Woodland and Late Archaic		X	X
CCI.12	Prehistoric, unknown	X		

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Coe, Joffre L.
1964 Formative Cultures of the Carolina Piedmont. Transactions of the American Philosophical Society, n.s. Vol.54, Pt. 5. Philadelphia.

Environmental Protection Agency
1975 Draft Environmental Impact Statement, Crabtree Creek, Wake County, North Carolina, EPA Project C370344, United States Environmental Protection Agency, Region IV, Atlanta.

APPENDIX

Key to Abbreviations

CCI Artifact Inventory

NMR - No Material Recovered

Lithic Material

Q - Quartz

Q/ - Quartzite

R - Rhyolite

C - Chert

Pottery

Temper

G - Grit-tempered

Surface Treatment

C - Cord-marked

N - Net-impressed

P - Plain

? - Indeterminate

Projectile Points

Sn - Side-notched

Tools

Bf - Biface

Sc - Scraper

Other

CO - Core

FCR - Fire-cracked rock

frag. - fragment

CCI Artifact Inventory

CCI.1

Sample #	Pottery	Points	Tools	Debitage	Other
General Surf.			1QBf	2Q, 2R	
1				2Q	
2				1Q	
3				1R	
4				4Q, 3R	
5 NMR					
6	2G/C 1G/N			1Q	
7 NMR					
8				2Q	
9 NMR					
10				1Q	
TOTAL	2G/C 1G/N		1QBf	13Q 6R	

CCI.3

Sample #	Pottery	Points	Tools	Debitage	Other
General Surf.				6Q	1QCo
1				2Q	
2				1Q	
3 NMR					
4				2Q	
5				5Q, 1R	
6	1G/P			8Q	1FCR 1QCo
7	1G/?			5Q	
8	1G/P			12Q, 4R 1Q/	1 graphite frag.

	Pottery	Points	Tools	Debitage	Other
TOTAL	2G/P 1G/?			41Q 5R 1Q/	2QCo 1FCR 1 graphite frag.

CCI.4

Sample #	Pottery	Points	Tools	Debitage	Other
General Surf.			1QBf		1FCR
TOTAL			1QBf		1FCR

CCI.5

Sample #	Pottery	Points	Tools	Debitage	Other
General Surf.			2QBf	2Q	
1				1Q	
2 NMR					
3			1QBf	7Q	
4 NMR					
5				25Q	
6			2QBf	10Q	
7 NMR					
8				1Q	
9				5Q	
TOTAL			5QBf	51Q	

CCI.8

Sample #	Pottery	Points	Tools	Debitage	Other
General Surf.			3QBf	1Q, 2R	
TOTAL			3QBF	1Q, 2R	

CCI.9

Sample #	Pottery	Points	Tools	Debitage	Other
General Surf.				2Q	
1				4Q, 2R	1FCR
2				1R	
3				7Q	
4	NMR				
5				1Q, 1R	
6				1Q	
7				2Q	1 wire nail frag.
8				3Q	
9				2Q	
10				2Q, 2R	
11				1R	1 machine-cut nail frag.
12				1Q, 1R	
13			1QBf	2Q	1FCR
TOTAL			1QBf	27Q 8R	2FCR 1 wire nail frag. 1 machine-cut nail frag.

CCI.10

Sample #	Pottery	Points	Tools	Debitage	Other
General Surf.			2QBf	2Q	
1	NMR				
2	NMR				
3				2Q	
4				3Q	
5				4Q	

Sample #	Pottery	Points	Tools	Debitage	Other
6 NMR					
7				4Q	
TOTAL			2QBf	15Q	

CCI.11

Sample #	Pottery	Points	Tools	Debitage	Other
General Surf.	1G/P	1Q/Sn,	1QBf	2Q, 1R	1QCo
	1G/N	serrated	1RBf		
1				3Q	
2	1G/P				
3				1Q	
4				2Q	
5				2Q	
6				1R	1FCR
7				2Q	
8				1R	
9 NMR					
TOTAL	2G/P	1Q/Sn,	1QBf	12Q	1QCo
	1G/N	serrated	1RBf	3R	1FCR

CCI.12

Sample #	Pottery	Points	Tools	Debitage	Other
General Surf.		1C frag.			
TOTAL		1C frag.			

CCI.C

Sample #	Pottery	Points	Tools	Debitage	Other
General Surf.				1R	
TOTAL				1R	

APPENDIX 15

VEGETATIVE SURVEY

Vegetation Analysis of the Proposed Crabtree Creek Interceptor in Wake Co., N. C.

Prepared for Peirson and Whitman, Inc.
by
Jon M. Stucky, Ph.D.
and
Bill Champion,
Graduate of Forestry School

Field Work Completed in
September and October, 1975

Submitted in December, 1975

INTRODUCTION

This survey was conducted to fulfill requirements for environmental assessments in regard to vegetation. During the survey, the vegetation along the proposed Crabtree Creek Interceptor was analyzed for the purposes of compiling a species list of the dominant canopy and subcanopy species, establishing the community types that would be affected by the proposed construction, and mapping the locations of any populations of rare species or communities in an ecological balance such that they might be totally and permanently destroyed by the construction.

DESCRIPTION OF VEGETATION

Contract IV; Crabtree Creek, Richland Creek, and Wyatt Branch Outfalls

The right-of-way (RW) began approximately 100 yds. south of the intersection of Oak Park Road and Weaver Connell Drive in a mature river bottom forest on the north side of Crabtree Creek. The canopy of this forest was dominated by *Liriodendron tulipifera* (15-20" DBH), *Betula nigra* (24" DBH), *Acer saccharum* (25" DBH), *Quercus alba*, *Q. falcata*, and *Liquidambar styraciflua*. The dominant subcanopy species were *Carpinus caroliniana*, *Ilex opaca*, *A. saccharum*, *Carya glabra*, and *C. tomentosa*. The RW parallelled Crabtree Creek as it turned northwest and passed through bottomland forest of this type for 2500'. At this point, the RW crossed Crabtree Creek to the west side and passed up a gradual slope that had shallow rocky soil. The vegetation at this location was poorly developed. The canopy was dominated by *Fagus grandifolia* (15-25' ht.) and the understory was composed of scattered saplings of this same species. This vegetation type extended approximately 200' along the RW.

The vegetation type along 500' of the RW southeast of Duraleigh Rd. was a mixed pine-hardwood forest with *Pinus taeda* in the canopy along the up slope side and *Liquidambar styraciflua*, *Acer saccharum* and *Betula nigra* on the creek side of the RW. Saplings of *Quercus nigra* and *Ulmus americana* and *Hamamelis virginiana* predominated in the understory.

The RW passed under the Duraleigh Rd. bridge and parallelled Crabtree Creek through the property of the Nello Teer Co. About 300' west of the bridge, the RW passed between Crabtree Creek and two silt ponds belonging to the Company. The bank of the silt ponds were about 50' from the bank of the creek. This space restriction might pose some construction difficulties. The land on the Company property had been disturbed so the vegetation was composed entirely of weedy herbs; Solidago sp., Aster pilosus, Ambrosia artemisiifolia, and Eupatorium capillifolium. This weedy vegetation continued approximately 1000' along the RW.

The RW next crossed to the west side of Crabtree Creek and passed just west of a maching shop owned by the Company. Approximately 300' southwest of the machine shop the RW recrossed Crabtree Creek to the southwest side. In this area the line ran parallel to the creek along a floodplain approximately 75-100' wide. The floodplain was bordered on the southwest by a steep rocky slope. The vegetation in this area was sparse, being composed of widely scattered low canopy trees, a thin subcanopy, and a thin herb layer. Betula nigra dominated the canopy near the creek bank and Liriodendron tulipifera (15-20" DBH), Acer saccharum (20-25" DBH), and Liquidambar styraciflua (15-20" DBH) dominated the canopy farther from the creek. The subcanopy dominants included saplings of Acer saccharum, Ulmus rubra, and Carya spp. This cover type extended approximately 700' west along the RW.

The bottomland forest in the area approaching the junction of Crabtree and Richland Creeks was composed of younger canopy than that of the previously described area. Fraxinus pennsylvanica, Acer saccharum, Liriodendron tulipifera, and Platanus occidentalis dominated the canopy. The subcanopy and herbaceous layers were denser than in the previous cover type. Liriodendron tulipifera saplings and Aesculus sylvatica (3" DBH, 8' ht.) and Lindera benzoin dominated the shrubby understory.

A grove of 15-20 individuals of Juglans nigra (8-12" DBH) was located 150-300' east of the junction of Crabtree and Richland Creeks. There was no apparent walnut reproduction so care should be taken to avoid destroying these maturing individuals. This walnut grove is mapped on sheet 5 of Contract IV.

The RW sharply turned south and crossed Richland Creek approximately 400' south of the junction of the two creeks. Another individual of Juglans nigra was located next to Richland Creek near this point where the RW crossed the creek. This walnut is actually outside the RW but care should be taken to avoid its accidental destruction.

After crossing Richland Creek, the RW sharply turned to the east and paralleled the creek. The vegetation was a mature bottomland forest with a canopy dominated by *Liquidambar styraciflua* (20-25" DBH), *Liriodendron tulipifera*, and *Quercus alba* (15-25" DBH) and an understory of *Carpinus caroliniana* and saplings of *Fraxinus pennsylvanica* and *Acer saccharum*. This bottomland forest extended 1000' southeast along Richland Creek.

The next cover type was composed of widely scattered young individuals of *Pinus taeda* (5-8" DBH) and scattered individuals of *Ulmus americana*, *Cercis canadensis*, *Cornus florida*, and *Prunus serotina* in the low canopy and *Solidago* sp., *Bidens frondosa*, *Eupatorium* sp., and *Aster pilosus* in the weedy herb layer. This pine dominated area extended 1000-1500' along the RW.

The RW next passed over a hill through approximately 500' of an undisturbed slope community dominated by *Quercus alba*, *Q. rubra*, *Ulmus americana*, and *Fagus grandifolia* in the canopy and *Rhus copallina*, *Smilax* sp., and *Diospyros virginiana* saplings in the understory. The next 500' was a disturbed area overrun by *Lonicera japonica*, *Rubus* sp., and *Smilax* sp.

A cover type with a canopy dominated by *Fagus grandifolia*, *Quercus alba*, *Q. rubra*, and *Ulmus americana* and an understory with saplings of *Acer saccharum*, *Ulmus americana*, *Nyssa sylvatica*, and *Cornus florida* was next traversed by the RW. This cover type extended 600-800' along the RW.

Richland Creek and the RW abruptly turned west about 1/8 mi. east of Ebenezer Church Road. The canopy in the area from this point to the road was dominated by *Pinus taeda* (50-70' ht.), scattered *Betula nigra* in the depressions, and *Fagus grandifolia* on the slopes and slight elevations. The understory dominants included *Alnus serrulata* and *B. nigra* saplings in the low areas and *Carpinus caroliniana*, *Cercis canadensis*, and *Acer rubrum* on the slopes and elevations.

The RW next crossed Ebenezer Church Road and ran northwest in the ditch parallel to the road for 750'. Only weedy herbaceous species, *Solidago* sp., *Aster pilosus*, *Ambrosia artemisiifolia*, and *Amaranthus hybridus*, and scattered individuals of *Rubus* and *Lonicera japonica* occurred in the RW in this area.

The RW abruptly turned west between Richland Creek and a private driveway. There was an area of extremely dense shrub and vine vegetation composed of *Lonicera japonica*, *Rubus* sp., and *Smilax* sp. that stretched about 200' west along the RW. This vegetation changed fairly abruptly into a rich stand of bottomland forest in the narrow floodplain north of the creek.

The canopy species included *Acer saccharum*, *Ulmus alata*, *Liquidambar styraciflua*, *Liriodendron tulipifera*, *Quercus alba*, *Platanus occidentalis*, and *Fraxinus pennsylvanica*. The understory was dominated by saplings of *Fraxinus* and *Ulmus* with occasional patches of *Rubus* spp. and *Lonicera japonica*.

The RW soon passed within 20-25' of the southeast bank of a small pond. At this same point, a small grove of 10-15 individuals of *Juglans nigra* (10" DBH, 40' ht.) was located on the southeast edge of the RW. The pond on the northwest and the walnuts on the southeast edge of the RW will require that care be exercised during construction in this area so neither the ecology of the pond nor the walnuts are destroyed. The walnut grove is mapped on sheet 9 of Contract IV.

The RW passed through the weedy area under a power line and into a forest dominated by *Fraxinus pennsylvanica* and *Quercus alba* (15-20" DBH) in the canopy and *Acer saccharum* saplings, *Carpinus caroliniana*, *Ostrya virginiana*, and *Cornus florida* in the subcanopy. *Viburnum acerifolium* was dominant in the shrub layer. This oak-ash cover type extended 750-1000' along Richland Creek.

The creek and the RW then turned sharply west and back south. At this pair of turns in the creek, the floodplain was saturated with water. The canopy was dominated by large individuals of *Fraxinus pennsylvanica* (25" DBH) and *Platanus occidentalis* (25" DBH). The extremely wet condition of the soil was indicated by the dominance of *Impatiens capensis*, *Cinna arundinacea*, and *Tovara virginiana* in the herbaceous understory. This wet area extended approximately 1000' along the RW,

The RW soon entered a pasture with no vegetation other than grass. The RW ran through this pasture for 1500' before crossing to the south side of Reedy Creek Road.

The bottomland forest on the south side of Reedy Creek Road was dense and the canopy dominants were *Platanus occidentalis* (15-20" DBH), *Ulmus rubra* (15" DBH), and *Fraxinus pennsylvanica*. This bottomland forest occupied approximately 300' of the RW. When the RW turned west away from Richland Creek, the bottomland species were replaced by a dense stand of *Pinus taeda* (18-22" DBH) that extended up slope to the north. Hardwoods were restricted to the subcanopy. The dominants in this subcanopy were *Acer rubrum* and saplings of *Quercus* spp. *Lonicera japonica* was the dominant of the herb layer. This pine dominated cover type occupied the next 1500' of the RW. Approximately 300' into this pine cover type, the RW crossed the south edge of a dirt dam. Behind this dam to the west was a pond. The pond is mapped on sheet 13 of Contract IV. The RW passed to the south of the pond and, if care is exercised, construction should not upset the ecology of the pond.

At the west edge of the pine dominated area, the RW began to ascend the east face of a slope. Just to the west of the marker for Manhole #66 was located a pure stand of 20-25 individuals of Fagus grandifolia (20-25" DBH). The beeches were protected due to their eastward exposure and, as a result, were particularly healthy specimens. There was no apparent beech reproduction in this area, as a result of the area being fenced for cattle. The only understory component was Juniperus virginiana. Pure stands of beech are not common, so it is recommended that a number of these beeches should be saved. This beech grove is mapped on sheet 14 of Contract IV. The remaining 800-1000' west to Trinity Road (SR 1655) was occupied by pasture and weed vegetation. The RW then ran south-southeast down the center of SR 1655 for 500' before it turned west into the area covered in Contract III.

Contract V; Richland Creek Outfall and Interceptor

The RW for Contract V originated 250' south of Reedy Creek Road along the west bank of Richland Creek. The RW in this area ran quite close to Richland Creek; the center line at one point only 15' from the creek bank. A dense population of Betula nigra (15-20" DBH) dominated the canopy of the bottomland forest. Scattered among the birches were large individuals of Fraxinus pennsylvanica, Platanus occidentalis (25" DBH), and Liquidambar styraciflua (25" DBH). Saplings of Acer saccharum and Quercus rubra dominated the subcanopy while Lonicera japonica and Rubus spp. dominated the low shrub and herb layer. This bottomland forest extended 750-900' along the RW paralleling Richland Creek.

The dominant birch forest was replaced by a more diverse forest in the next area where the RW began to ascend a slope and the soil was not as wet. The canopy was composed of Liriodendron tulipifera, Liquidambar styraciflua, Carya cordiformis, with occasional large individuals of Fagus grandifolia (25" DBH). The subcanopy included Oxydendrum arboreum, saplings of Quercus alba, Q. rubra, and C. cordiformis, Cornus florida, Cercis canadensis, and occasional individuals of *Tilia heterophylla*. This mesic slope cover type with scattered individuals of *Betula nigra* and *Fraxinus pennsylvanica* near the creek extended approximately 3000' to a point where the RW approached to within 50' of the west bound lane of I-40.

At this point the RW assumed a southeast direction to parallel I-40. The runoff from the slope of I-40 to the southwest and Richland Creek to the northeast made the substrate of the RW wet in much of the next 1000'. The vegetation reflected this increased moisture. The oaks and hickories declined in abundance and were replaced by birch, sweetgum, alder, and some sycamore. A stand of 50-75 individuals of *Betula nigra* (15-20" DBH) occupied the 300' extent of the RW in the area just southeast of the junction of the RW and I-40 to the point where the RW crossed Richland Creek.

Immediately after crossing to the southeast side of Richland Creek, the RW ran through a pure stand of 30-40 individuals of *Liriodendron tulipifera* (15-20" DBH). These trees were research material of the North Carolina State University School of Forestry. Considering the large amount of time that the School of Forestry had to invest to raise an experimental population of trees as large as these, it is suggested that care be taken to injure or destroy as few of these trees as possible. The trees are widely spaced so reducing the number of trees harmed should not be unreasonably difficult. The location of this experimental plot of tulip trees is plotted on sheet 5 of Contract V.

The RW then entered more bottomland hardwood forest with a canopy dominated by *Liriodendron tulipifera* and *Liquidambar styraciflua* and a subcanopy dominated by *Alnus serrulata* and young *Betula nigra* (5-10" DBH), with scattered individuals of *Morus rubra*, *Cornus florida*, and *Carpinus caroliniana*. This bottomland forest extended 1000-1200' along the RW.

Near the proposed location for Manhole #28, the RW entered an extensive area of wet soil and large shallow expanses of standing water. The wet condition of this area could cause construction difficulties. *Betula nigra* and *Liquidambar styraciflua* were the canopy dominants in this wet area. *Salix nigra* occurred as several small scattered groves. The subcanopy and herb layer were sparse. This swampy area extended over 1500' of the RW.

The RW then emerged from the swampy area into a field occupied by small planted pines belonging to the North Carolina State University School of Forestry. The RW was sandwiched between these pines on the northeast and Richland Creek on the southwest. The space available for construction between the pines and the creek was minimal, so care will be necessary to avoid destroying some of these pines. The RW continued to skirt the south edge of the open fields owned by North Carolina State University and the north bank of Richland Creek. The vegetation along the bank was composed largely of dense low woods of *Alnus serrulata*, *Liquidambar styraciflua*, and *Liriodendron tulipifera*. The branch of the RW on the northeast side of I-40 continued to fringe NCSU fields for approximately 3500'.

The RW next encountered light woods along Richland Creek composed of *Pinus taeda*, *Salix nigra*, and small individuals of *Liquidambar styraciflua*. The understory became thick with weedy herbs and shrubs such as *Rubus* spp., *Solidago* spp., and *Aster pilosus* as the RW approached the National Guard Armory.

A branch of the RW included in Contract V veered south along a small branch of Richland Creek and crossed I-40. The canopy of the vegetation here was dominated by *Pinus taeda* (15-20" DBH) with occasional individuals of *Liquidambar styraciflua*, *Liriodendron tulipifera*, and *Betula nigra* near the stream. Small individuals of *Cornus florida*, *Alnus serrulata*, *Acer rubrum*, and saplings of *Quercus rubra* occupied the subcanopy. *Arundinaria gigantea* and *Lindera benzoin* were prominent in the understory. This pine forest extended 2500' along the RW.

At the end of the 2500' stretch of pine forest described above, the Carter Stadium Interceptor RW veered east toward Carter Stadium. It passed through the pine forest for 700' and then through the Carter Stadium parking lot for 1050'.

Beginning at its junction with the Carter Stadium Interceptor RW, the main north-south RW passed out of the pine forest and ran along the south margin of a cultivated field for 1000'. The low, dense vegetation of the creek bank on the south edge of the RW was composed primarily of *Alnus serrulata* and *Myrica cerifera*.

The RW then crossed Old Trinity Road into more pine forest with a composition like that encountered on the north side of Trinity Road. The composition of this forest remained constant all the way to Mt. Vernon Goodwin School, a distance of 3900'.

At a point along the RW 900' south of Old Trinity Road, the State Fairgrounds Interceptor RW branched off the Mt. Vernon Goodwin School RW and ran east to the State Fairgrounds. The RW began to ascend a north facing slope and the pine forest graded into a slope community composed of *Quercus alba* in the canopy, with *Liriodendron tulipifera* and *Q. rubra* at the base of the slope nearer the stream. The subcanopy of the slope community was dominated by *Oxydendrum arboreum* and saplings of *Acer rubrum*. *Oxydendrum arboreum* saplings, *Viburnum acerifolium*, and *Hamamelis virginiana* were important components of the understory with occasional patches of *Osmunda regalis* nearer the creek. This slope community extended the 2200' to SR 1658 just west of the State Fairgrounds. The RW then passed into the Fairgrounds.

Contract III; 20" Sewage Force Main

The vegetation along the RW included in Contract III is described as it was encountered starting from SR 1655, sheet 22, then running northwest along I-40 toward the area depicted by sheet 13. In general, the section of the RW between SR 1655 and SR 1654 at the entrance to Umstead State Park ran perpendicular to the long axes of numerous ridges and ravines. The vegetation on the different slopes was quite similar and is presented in tabular form. The areas that departed from this slope vegetation type are described in the text.

The RW entered the area characterized by the ridges about 500' west of SR 1655. This topography and the accompanying vegetation occupied the next 3200' of the RW.

SLOPE VEGETATION

DOMINANTS

	Upper Slope	Mid Slope	Lower Slope
Canopy	Pinus taeda	Quercus alba Fagus grandifolia	Liriodendron tulipifera Liquidambar styraciflua Fraxinus pennsylvanica
Subcanopy	Oxydendrum arboreum	Cornus florida Acer rubrum Oxydendrum arboreum Fagus grandifolia Carpinus caroliniana Ostrya virginiana	Cercis canadensis Acer rubrum Ulmus rubra
Understory	Carya spp. saplings	Oxydendrum arboreum Viburnum acerifolium	Magnolia tripetala Acer saccharum saplings

The RW emerged from the area of the ravines and slopes into floodplain vegetation adjacent to Reedy Creek. The RW ran through this vegetation in a path parallel to the Creek for approximately 2200'. The canopy in the vicinity of the Old Mill on Reedy Creek was dominated by *Quercus phellos* (25" DBH), *Liquidambar styraciflua*, and *Liriodendron tulipifera* (15-18" DBH) with scattered individuals of *Betula nigra* and *Juglans nigra* near the stream. The subcanopy of the floodplain vegetation in this area was composed mainly of *Magnolia tripetala* and *Tilia heterophylla* near the stream and *Carpinus caroliniana* and *Ostrya virginiana* up slope from the stream. *Lindera benzoin*, *Ulmus rubra*, and *Polystichum acrostichoides* were important in the understory. A large individual of *Juglans nigra* (23" DBH, 90' ht.) worthy of being saved was located approximately 500' northwest of the Old Mill at the junction of Reedy Creek and one of its small tributaries. It was situated on the edge of the RW next to the creek. Its location is plotted on sheet 18 of Contract III.

The RW next began to ascend a slope up out of the floodplain toward SR 1654. The vegetation on this slope was dominated by *Pinus taeda* and *Quercus coccinea* in the canopy and *Oxydendrum arboreum*, *Q. prinus*, *Acer rubrum*, and scattered individuals of *Kalmia latifolia* in the subcanopy. This vegetation type persisted the 1750' to SR 1654.

The next 3150' of the RW of Contract III passed along the middle of an existing dirt road. No natural vegetation would be disturbed in this area. The final 1500' of the RW passed over a series of ridges characterized by dense stands of *Pinus taeda* and *Quercus prinus* on the ridges and *Liquidambar styraciflua* and *Liriodendron tulipifera* on the lower slopes.

Contract VI; Crabtree Creek, Coles Branch, and Mobile City Outfalls

The RW began just west of the site for the proposed pumping station included in Contract III. At this point, the RW parallelled the south side of Crabtree Creek for 1800'. The topography here was quite level and the soil was wet. The canopy of the lowland forest vegetation was dominated by *Betula nigra* (50' ht.) with scattered large individuals of *Liquidambar styraciflua* (60' ht.). The subcanopy included *Acer saccharum*, *Carpinus caroliniana*, and small individuals of *Fagus grandifolia*. After passing south underneath I-40, the RW passed through similar heavy stands of *B. nigra* for an additional 1450'.

The RW next veered west away from Crabtree Creek as it entered a vegetation type dominated by young individuals of *Pinus taeda* (5-8" DBH, 20' ht.). This pine dominated vegetation extended 1400' along the RW. The subcanopy of this vegetation was composed of *Oxydendrum arboreum*, *Cornus florida*, and *Acer rubrum*.

The RW next passed within 40-50' of the east side of an extensive marsh that was estimated to be 1/4 x 1/8 mi. in area. The bank of the marsh was occupied by *Typha latifolia* and *Scirpus* sp. The canopy in the adjacent forest was a mixture of *Betula nigra*, *Liquidambar styraciflua*, and *Platanus occidentalis*. The RW skirted the east edge of this marsh for approximately 600' before veering west across a stream. The RW in this area was probably far enough away from the marsh itself to avoid destroying the aquatic vegetation along the bank.

Once across the stream and on the southwest side of the marsh, the RW passed through bottomland forest with a sparse canopy of *Liriodendron tulipifera* and *Liquidambar styraciflua* and a subcanopy of *Cornus florida*, scattered *Pinus taeda*, and *Carya* sp. saplings. The RW then ascended a steep rocky slope into a community dominated by *Fagus grandifolia* and *Quercus alba*. The RW traversed this steep slope for approximately 600' before entering an area of mixed woods with heavy understory. The canopy dominants in this area were *Liriodendron tulipifera*, *Quercus alba*, and *Pinus taeda*. The dense understory was composed of *Lonicera japonica* and *Smilax* sp. This mixed woods continued for approximately 1500'.

The vegetation type throughoyt the next 1650' was situated on a steep, rocky slope and was composed of a low, sparse canopy of *Pinus taeda* (20' ht.) with scattered small individuals of *Liriodendron tulipifera* and *Liquidambar styraciflua* (15' ht.). Occasional individuals of *Juniperus virginiana* occurred here indicating the dry nature of this slope. The understory was composed mainly of *Lonicera japonica* and *Smilax* sp.

For the next 1200' the pines decreased in abundance. This area was occupied by a mixed hardwood stand dominated by Quercus alba with a diverse subcanopy including *Oxydendrum arboreum*, *Acer rubrum*, and *Cornus florida* and an understory dominated by *Viburnum dentatum*.

The RW left the mixed hardwoods and entered a cleared area 200; long that was occupied by small pines (15' ht.) and a grassy understory. The RW turned sharply south and gradually entered a more mesic area occupied by a mature bottomland forest composed of *Betula nigra* (60' ht.), *Fraxinus pennsylvanica* (80' ht.), *Platanus occidentalis*, *Liriodendron tulipifera*, and *Quercus phellos*. The subcanopy was composed mainly of *Carpinus caroliniana* and *Ulmus alata*. The understory was moderately dense with saplings of *Acer rubrum*, *Liquidambar styraciflua*, *Quercus falcata*, and *Magnolia tripetala*. This mature bottomland forest occupied 1500' to the point where the Mobile City Outfall departed from the main RW.

The area along the main RW beyond the Mobile City Outfall junction became less mesic and *Pinus taeda* and *Quercus rubra* shared dominance in the canopy with the bottomland species. *Oxydendrum arboreum* increased in the subcanopy with the drier substrate. This mexed pine-oak-gum woods persisted along the RW for approximately 1100'. At this point the RW entered and passed through a corn field for 1150' to NC Highway 54.

The RW crossed NC Highway 54 and began traversing a cleared trail that was approximately 20' wide and that parallelled Crabtree Creek. The trail itself had been cleared of natural vegetation and only herbaceous weeds grew on it. The narrow bank of river bottom vegetation that was left between the trail and Crabtree Creek to the west was composed mostly of large individuals of *Betula nigra* with scattered *Platanus occidentalis*, *Fraxinus pennsylvanica*, *Ulmus alata*, and *Sassafras albidum*. On the east side of the trail farther from the creek, *Pinus taeda* was associated with the bottomland species. There were frequent individuals of *Alnus serrulata* along the creek bank in the subcanopy. Construction in this area should not disturb much vegetation other than the weeds in the trail and the very edge of the adjacent vegetation. The RW followed the cleared trail for approximately 2600'.

The RW then entered a fallow field with grass, *Festuca pratensis*, and scattered weeds, *Eupatorium capillifolium*. The RW exited this field and entered a corn field. At the point where Cole's Branch joins Crabtree Creek, the RW turned sharply eastward and continued through a cleared field. The total distance that the RW passed through these fields was 3100'.

The RW then entered an extensive pine forest. This forest was dominated by *Pinus taeda* (40-50' ht.) with *Myrica cerifera*, *Oxydendrum arboreum*, *Prunus serotina*, and saplings of *Liquidambar styraciflua* predominating in the understory. The RW passed through this vegetation type for 5300' to a point where it ran within 30' of Cole's Branch to the south.

At this point, the vegetation began to assume a more mesic aspect with *Liquidambar styraciflua* and *Liriodendron tulipifera* beginning to share dominance and finally replacing *Pinus taeda* in the canopy. In the subcanopy, *P. taeda* still persisted with *Juniperus virginiana*. This mixture of pine and bottomland species persisted for approximately 2000'.

At this point, the RW passed into a mature mixed mesophytic forest composed of *Fraxinus pennsylvanica*, *Betula nigra*, *Quercus phellos*, *Liriodendron tulipifera*, and *Liquidambar styraciflua* in the canopy and *Acer saccharum*, *Tilia heterophylla*, *Q. rubra*, *Cornus florida*, *Carpinus caroliniana*, and *Ulmus rubra* in the subcanopy. A mixed forest of this composition occupied the RW for the remaining 8000' to its termination at the Cary Water Treatment Plant.

At one point in this mesophytic forest, there was an individual of *Juglans nigra* that was located directly on the RW. This tree was especially worthy of mention because it was the finest specimen of this desireable and diminishing species that the investigators, both botanists, had seen in this part of North Carolina. The tree was 20" DBH and 100' tall. Its trunk was straight and devoid of branches for the lowest 40-50;. No walnut reproduction was noted in the area. This individual was located on the RW 300-500' north-northwest of the overhead powerlines in the area represented on sheet 27 of Contract VI. Its position is plotted on this sheet.

Seedlings of *Juglans nigra* are shade intolerant, so this species can not reproduce in dense woods. This shade intolerance and the heavy lumbering of this species have severely reduced its abundance in North Carolina. Although this species is not on the list of rare and endangered species for North Carolina, it is no longer common and every effort should be made to preserve especially fine specimens such as the one encountered. The investigators recommend that this individual be identified in the field and the RW diverted around it.

SUMMARY

Based on the 40' width of the RW and the estimated lengths of the vegetation types encountered along the RW, it is estimated that construction of the proposed Crabtree Interceptor would disturb 19 acres of vegetation that has already been altered by man (vegetation of roadsides, pastures, fallow fields, and cultivated fields), 39 acres of hardwood forest, 23 acres of pine forest, and 3 acres of mixed pine-hardwood forest.

None of the species encountered along the RW are included in the list of rare and endangered species for North Carolina or for the United States. However, in the opion of the investigators, *Juglans nigra* is declining in abundance in this part of North Carolina to such an extent that every effort should be exerted to preserve especially fine specimens and reproducing populations of this species. The investigators recommend that construction of the Crabtree Interceptor could occur without destroying any rare or endangered species or populations in delicate ecological balance if the individuals and populations at the following sites are avoided:

Contract IV, sheet 5; *Juglans nigra*, grove of 15-20 individuals
Contract IV, sheet 9; *Juglans nigra*, grove of 10-15 individuals and pond
Contract IV, sheet 13; pond
Contract IV, sheet 14; *Fagus grandifolia*, population of 20-25 individuals
Contract V, sheet 5; *Liriodendron tulipifera*, experimental plot
Contract III, sheet 18; *Juglans nigra*, single individual
Contract VI, sheet 27; *Juglans nigra*, single individual

SPECIES LIST OF IMPORTANT CANOPY AND SUBCANOPY SPECIES

Acer negundo
A. rubrum
A. saccharum
Aesculus sylvatica
Alnus serrulata
Betula nigra
Carpinus caroliniana
Carya cordiformis
C. glabra
C. ovata
C. tomentosa
Celtis laevigata
Cercis canadensis
Cornus florida
Crataegus sp.
Diospyros virginiana
Euonymus americanus
Fagus grandifolia
Hamamelis virginiana
Ilex opaca
Juglans nigra
Juniperus virginiana
Kalmia angustifolia
Liriodendron tulipifera
Liquidambar styraciflua
Lindera benzoin
Magnolia tripetala
Nyssa sylvatica
Ostrya virginiana
Oxydendrum arboreum
Pinus echinata
P. taeda
Platanus occidentalis
Populus deltoides
Prunus serotina
Quercus alba
Q. falcata
Q. michauxii
Q. nigra
Q. phellos
Q. prinus
Q. rubra
Q. velutina
Rhus copallina
R. glabra
R. radicans
Robinia pseudoacacia
Salix nigra
Smilax sp.
Sambucus canadensis
Tilia heterophylla
Ulmus alata
U. rubra
Vaccineum sp.
Viburnum acerifolium
V. dentatum
V. prunifolium
Vitis sp.

By Dale W. Jenkins
and Edward S. Ayensu

Extinct in the wild by 1806, the lost Franklinia may become the symbol for endangered U.S. plants.

One-tenth of our plant species may not survive

The first national census of threatened plants in the United States lists some 2,000. For many reasons, all of us stand to be the losers

The lost Franklinia shown above is the first native species of flowering plant of North America known to have become extinct in the wild. This splendid tree was discovered in 1765 on two acres near the Altamaha River in Georgia. It is named *Franklinia alatamaha* in honor of Benjamin Franklin. It was exterminated in the wild by 1806 and survives in cultivation only because of the beauty and fragrance of its flowers, for which it was apparently greedily collected. Specimens were taken to England's Kew Gardens and a few were cultivated in gardens in the United States. Three of them now grow in front of the National Museum of Natural History in Washington.

How many species of plants have become extinct in the United States since the arrival of the first settlers? More to the point, how many more are endangered or marked for extinction?

A proposed list of endangered, threatened and re-

SMITHSONIAN January 1975

cently—or apparently—extinct species of higher plants native to the United States has just been drawn up. It will be published by the Smithsonian Institution in response to the Endangered Species Act of 1973. This act called upon the Secretary of the Institution to review species of plants which are now or may become endangered, to present methods for preserving such species, and to report the results—with recommendations—to Congress in one year.

Of the approximately 20,000 species, subspecies and varieties of native higher plants of the continental United States, at least ten percent warrant concern. About 100 species are recently (within 200 years) extinct or presumed extinct, about 750 endangered, and more than 1,200 threatened. These species are either very rare, with local or limited distributions, are subject to threats, or are heavily depleted by destruction of habitats or by commercial or private collectors.

Hawaii is a special case. Its flora are among the most vulnerable and heavily damaged in the world. Of Hawaii's approximately 2,200 kinds of higher plants, the Smithsonian report lists about 50 percent of them as endangered or recently extinct.

Endangered species are those currently in danger of extinction throughout all or a significant portion of their range; *threatened* species are those likely to become endangered within the foreseeable future throughout all or a significant portion of their range; and *recently* or *possibly extinct* species of plants are those which can no longer be found after repeated search in the locality where they were originally observed, or in other likely places. Some species may be extinct in the wild but preserved in cultivation, as is the lost Franklinia.

The Smithsonian lists include the higher plants: angiosperms (flowering plants), gymnosperms (pines and relatives) and pteridophytes (ferns). Lower plant groups will be included later. Only species native or indigenous to the United States (including Alaska and Hawaii) were listed. If a rare species also occurred outside the United States, it was not listed unless its exact status was known. No introduced species were included. Species and well-recognized subspecies and varieties were included, but color forms, known hybrids and horticultural variations were excluded.

Even with all these restrictions and omissions, the number of endangered plants is alarmingly high. Unfortunately, plants are not only taken for granted, but are destroyed without concern. Most of us know that plants are essential to our survival, that we are dependent on their fixing solar energy as carbohy-

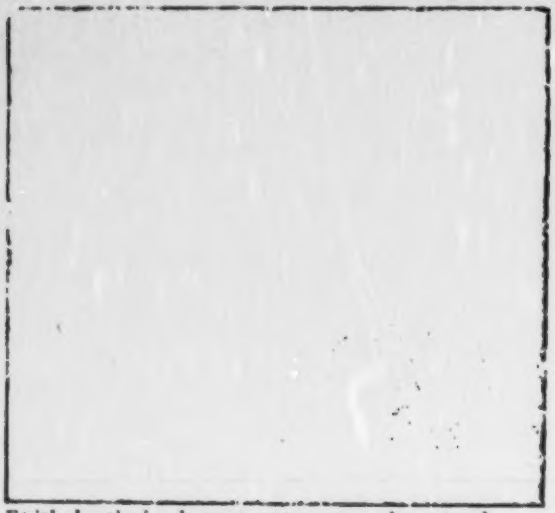
Dale Jenkins is consultant on the Endangered Plant Project; Edward Ayensu is chairman of the botany department, National Museum of Natural History.

Amoreuxia wrightii, too rare to have a common name, is endangered by collectors in its native Texas.

Hawaii's *Rollandia angustifolia* is pollinated by birds with bills curved to match its flowers.

Calochortus obispoensis is a threatened mariposa lily found only in Obispo County, California.

SMITHSONIAN JANUARY 1976



Epithalantha is a button cactus genus threatened by collectors and commercial exploitation in Texas.

The Tennessee coneflower, *Echinacea tennesseensis,* grows on cedar barrens, is threatened by construction.

drates in supplying our food, fiber, shelter and fuel. But we often fail to appreciate that the widest possible variety of plants is crucial to our future well-being for many other reasons.

Esthetic appreciation and love of beauty for its own sake are important reasons for preserving rare plants. Natural areas and flowers in our homes make our environment more livable and beautiful. But some of the most prized plants are also the most rare, and many rare species are too beautiful for their own good, especially orchids, cacti, lilies, heaths and primroses. Some medicinal plants such as ginseng and goldenseal have been seriously depleted by over-collecting. Unique or bizarre plants such as the carnivorous Venus's-flytrap and pitcher plants are commercially exploited.

Every species or variety of plant has a unique type of germ plasm, or gene pool, with its own genetically coded characteristics and values. When a plant species is extinguished, the gene pool cannot be duplicated or reestablished and is lost forever. Each kind that we destroy narrows our options. Imagine the loss to mankind if we had destroyed the cinchona before discovering quinine's antimalarial qualities. It is estimated that 50,000 new chemical compounds can be discovered in plants, including some with important medical uses. Plants produce biologically active chemicals, including safe insecticides, and provide us with the chemical structures to synthesize others.

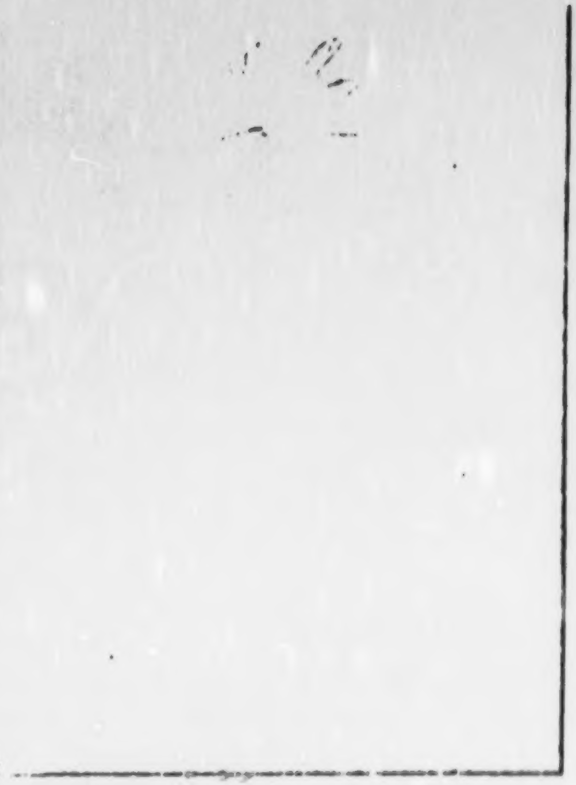
Food production has become a major world problem. The species of food plants now being grown and marketed are the results of long years of selection. Each species represents a unique genotype, and to lose some of the genetic variability could be disastrous. We need to conserve the progenitors of our present food crops (see p. 59) for use in hybridizing and crossbreeding, preserving original values, and developing disease- and pest-resistant strains. Some of the ancestors of corn, for example, are very rare; some are apparently extinct.

If we are to use presently uncultivated lands to supplement the world's food supply, or adapt crops to changing climates, new types and varieties of plants will have to be developed. We do not know which rare species may have value for food production.

The numerous habitats and ecosystems of the world require a wide diversity of plant species. This diversity is essential to maintain ecological stability and to prevent wind and water erosion, develop soil and retain water. Many of our rare and threatened species are especially valuable since they are able to grow in difficult habitats, such as cedar and shale barrens, islands, sand dunes, ocean and estuary shorelines, rock faces, mountaintops, bogs and other unstable areas. They should not be lost.

Throughout the course of the evolution of life on

THSONIAN January 1975



Prunus havardii, the Havard plum, has potential for agriculture but is threatened in Texas.

Earth, some species have disappeared, while others have adapted or developed into new forms. Those destroyed by the rising and sinking of the Earth's crust, flooding and severe climatic changes have been slowly replaced by new species adapted to the new environment. But enter Man, with his technology, growing population and general ignorance, and the natural tempo is speeded up like a time-lapse film of a sunset. There is no time for adaptation or replacement.

Habitat destruction is only one problem. Overgrazing by domestic animals, use of fertilizers and herbicides, introduction of foreign plants without their natural controls, and destruction of insect, bird and bat pollinators all can endanger plants. Locally introduced foreign diseases, insects, birds or other organisms may spread over the entire continent.

Plant populations are directly destroyed by the collection of entire plants, their seeds, fruits or flowers. Collectors of rarities persist in causing serious damage to critical species, despite the high frequency of unsuccessful transplants.

Now that we know how many species of plants are in trouble, what can we do to save them? Most important is preservation of their habitats. It is also important to control commercial exploitation. The public must be alerted to the damage done by transplanting rarities and picking their flowers. We need to study certain species to determine their requirements and to monitor their populations. Some, for example, may require periodic fire.

A promising approach to habitat preservation is mapping of all species to determine aggregations or centers of endangered ones.

In the United States there are several areas with concentrations of species known only in those regions. The major centers are in Florida, the southern Appalachian Mountains, Texas and California. * Locating endemic centers and aggregations of species enables us to set priorities for preserving their habitats. Land acquisition by federal, state and local government and by private groups, designation of natural landmarks and conservation easements are all ways to do it. Endangered plants should be given a high priority in evaluating environmental impact statements.

Commercial exploitation must be controlled. Nearly a third of the native cacti are on the endangered, threatened or extinct list. Yet cacti are commercially collected by the truckload, with most pressure on the rarest species which command the highest prices. Some species of cactus and other succulents are so rare that they could be made extinct in minutes. Commercial suppliers should be subject to stiff penalties for collecting threatened species from the wild. Rather, they should be encouraged to grow them directly from seed.

* Some of the plants more commonly found in the Southern Appalachian region are found along the south bank of Crabtree Creek in the Laurel Hills region

SMITHSONIAN JANUARY 1975

The craze for rarities should be discouraged. The owner of an extremely rare and endangered plant dug from the wild should be made to feel the same social disapproval that owners of leopard coats now receive.

Very important

Digging rare plants to transfer them to a garden, even a professionally run botanic garden, is not the answer. Breaking the roots of some species causes infection and death. Many rare plants have highly specialized requirements which are frequently unknown. Even if transplanting is successful, the future, especially the reproductive future, of the plant is uncertain. Plant collections are often lost with the death of the owner. Even the best botanic gardens' rare species are exposed to hybridizing with related species, and records may be lost over long periods of time. Artificial cultivation should be considered only as a last resort if an unavoidable threat endangers the species, and only with the ultimate objective of reestablishment in its original or a similar habitat.

It is incumbent on Man, as the dominant species, and the only species which has some control over not only its own future but the future of life around it, to interact wisely with his natural environment. The irony of the present situation is that Man, for the most part, is destroying those species which can give the best insight into evolutionary development. There are several thousand species which have adapted to unusual environmental conditions. What genetic quirks have they developed that nothing else has? With the answers to that question, Man might repair some of the damage already done, and be more effective in assuring future ecological stability.

Collectors and grazing have endangered the silver sword, *Argyroxiphium kauense*, in Hawaii.

SMITHSONIAN January 1975

APPENDIX 16

GREENWAY PLAN

Capital City Greenway Plan
Raleigh, North Carolina

Brief Description

The locally conceived and proposed Capital City Greenway System includes planned acquisition of the 100-year flood plain from Umstead State Park to the Neuse River. In its entirety, the Capital City Greenway System project basically proposes implementation of a metropolitan Raleigh "greenbelt" following the metropolitan area's flood plains. The Greenway System project proposes a "main stem" continuous greenbelt loop essentially following the Crabtree Creek and Walnut Creek flood plains. Greenway System "penetrators," following the numerous smaller urban tributaries to Crabtree Creek and Walnut Creek, will tie into the central greenbelt loop. The proposed Capital City Greenway Plan represents a nonstructural flood control method which has the potential to provide the following benefits: highly accessible outdoor recreation to a fast-growing metropolitan population, buffering of incompatible land-use zones, a humanly healthful and energy-conserving bicycle and pedestrian metropolitan transportation mode, maintenance of, or contribution to, clean urban air quality, reduction of certain toxicants in storm-water runoff water pollution, sociological neighborhood cohesion by linkage of community service facilities, and intangible aesthetic values associated with a natural environment.

According to the data of the Bureau of Outdoor Recreation, much of the 1,500-acre Crabtree Creek 100-year flood plain area is in a natural state. According to consultations with the Raleigh Recreation and Parks Department and with the Raleigh City Planning Department in February 1975, the Greenway System's status is as follows. Local funds in the amount of $350,000 are available for Greenway acquisition this year. These funds are expected to be used for full acquisition of the Lead Mine Creek Greenway penetrator on Crabtree Creek and of the Garner Branch Greenway penetrator on Walnut Creek this year. Local recreation funds of $200,000 are budgeted annually for additional Greenway acquisition in the next five fiscal years. The Raleigh Parks and Recreation Department and the citizens' Greenway Commission are supporting a vigorous program for Greenway flood-plain land donations. Approximately 75 to 100 acres of the Crabtree Creek flood plain are presently owned and developed for recreational purposes by the city of Raleigh.

In addition to locally budgeted municipal funds and private donations, sources of financial assistance to fully implement the entire Greenway System may include the following:

(1) The Land and Water Conservation Fund allocations.

(2) Contingency Reserve Funds from the Land and Water Conservation Fund.

(3) Special appropriation by the North Carolina State Legislature (this potential is under investigation by the city).

(4) Bicycle and pedestrian walkway grant funds per the Federal Aid Highway Act of 1973.

(5) Federal revenue sharing funds.

(6) Block grant funds per the Housing and Community Development Act of 1974.

(7) Federal grant funds for acquisition of the flood plain for flood control purposes per Section 73 of the Water Resources Development Act of 1974.

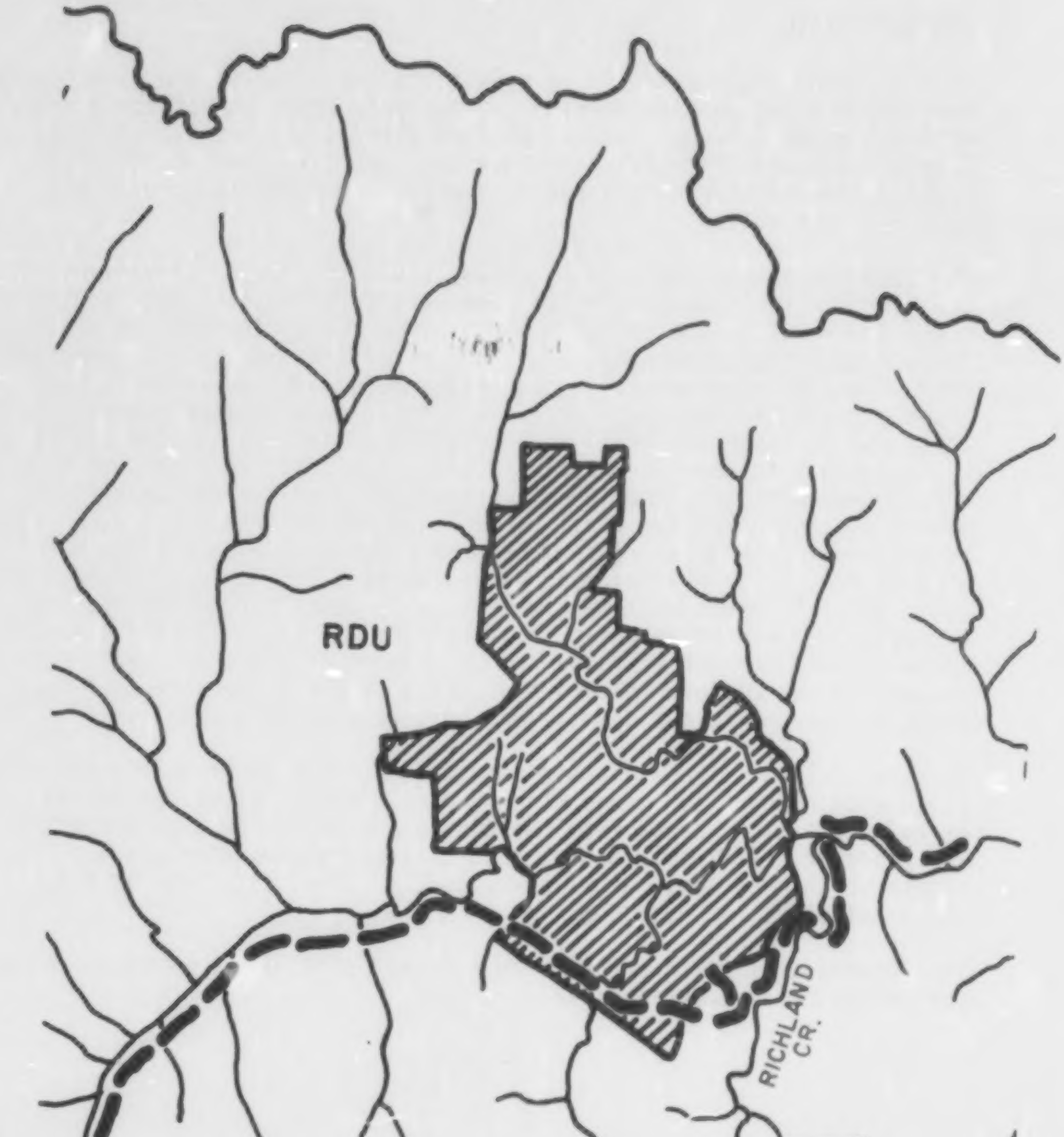
GREENWAY TRAIL

This page and the map facing it constitute the focus of the Wake County American Revolution Bicentennial Commission's proposed Horizon Project: A Bicentennial Greenway Trail. When completed, the trail would link Raleigh, Umstead State Park, Morrisville, and Cary, and would be the catalyst for maximizing the public benefits from the two previously mentioned projects.

The proposed sewer line's right-of-way would provide a multiple-use corridor for the Bicentennial Greenway Trail for most of its length, thereby generating additional benefits from the sewer line. A recently adopted master plan for the redevelopment of Umstead Park accommodates this Bicentennial proposal through its careful consideration to connecting points between park trails and those from outside the park. Thus, the Bicentennial trail would provide an opportunity for citizens of the county to walk or bicycle to the park, offering a more well-rounded recreational experience. Camping provided in the park will give added incentive for trail use for weekend excursions, giving people a way to enjoy a mini-wilderness experience within a few minutes of home. Surveys being conducted as part of the sewer line's environmental impact statement process will unveil archeological and biological points of interest that interpretive signs along the trail could explain for the education and enjoyment of the trail user. The visual and recreational pleasure of three of the flood-retention lakes would be brought to the county's rapidly urbanizing population.

This population, like all urban populations, will need recreational space within which to retune tired bodies after a day at the office or to seek a short break from the hustle and bustle of city activity. The proposed trail would appeal to urbanites by providing a space within which they could walk, hike, jog, or bike; sit, look at trees and wildflowers, or just be.

The Bicentennial Greenway would be a linear park within which an urban population could recreate itself.



BICENTENNIAL GREENWAY TRAIL

APPENDIX 17

COMMENTS FROM THE NORTH CAROLINA DEPARTMENT OF NATURAL AND ECONOMIC RESOURCES AND RESPONSE

NR North Carolina Department of Natural & Economic Resources

JAMES E. HOLSHOUSER, JR., GOVERNOR • JAMES E. HARRINGTON, SECRETARY

ARTHUR W. COOPER
ASSISTANT SECRETARY

BOX [illegible]
TELEPHONE [illegible]

April 14, 1975

EPA - IMPACT STATEMENTS
RECEIVED
APR 1 [illegible]
REGION IV, ATLANTA, GA.

Mr. David R. Hopkins
Chief, EIS Branch
Environmental Protection Agency
Room 208 - 1421 Peachtree Street, N.E.
Atlanta, Georgia 30309

Dear Mr. Hopkins:

The North Carolina Department of Natural and Economic Resources has reviewed the draft environmental impact statement entitled, "Crabtree Creek, Wake County, North Carolina, EPA Project C370344. We submit the following comments for EPA's consideration:

Title

The title of the EIS should be changed to reflect the nature of the proposed project, for instance, "Interceptor Sewer to Service the Upper Crabtree Creek Watershed, Wake County, North Carolina."

I. General Descriptive Information

1. Figure #1, page 4, portrays the proposed force main located along Interstate 40, between I-40 and William B. Umstead Park. The land between I-40 and the present park boundary is scheduled for acquisition by the state for inclusion in the state park. The proposed sewer line, therefore, would ultimately be located within the boundary of Umstead Park as it parallels I-40 and any environmental damages occurring during construction (or later) will be within the proposed park boundary. The destruction of wildlife habitat and the aesthetic degradation associated with a 40' wide clearcut for the right-of-way at the park's edge would be incompatible with the park and therefore unacceptable to this agency. As the segment of sewer line proposed to parallel I-40 is a force main and not gravity flow, its location need not be restricted to the north of the highway. Therefore, we suggest that consideration be given to having the sewer line cross I-40 at Trenton Road rather than at the Reedy Creek Road crossing and that the line be located within the I-40 road cut on the south side of the highway as it parallels I-40. The vegetative survey (reference Summary and p. 133) should be expanded to include this alternative right-of-way.

2. The discussion of service areas, pp. 9-17, gives population projection figures for different service areas. It would be helpful if a statement of the methodology used in determining these projections, and subsequent water use figures, were contained in an Appendix. Also, how do these population projections compare with recent projections, such as those of OBERS?

3. Reference page 14: Assumptions used for design purposes at the bottom of the table need a more thorough explanation. It is not clear from the explanation why a 6,779,000 gpd flow is projected and then a peak flow of 5,000,000 gpd is used for design purposes. An explanation of how water usage figures were derived is also needed. Why, for example, are the water usage figures for some students based on 20 gpd while for other students the figure is 10 gpd? Also, how were water usage figures derived for commercial and industrial users?

4. Figure 8 (the "Wake Wastewater Facilities Plan") is in error in that it shows the interceptor following Crabtree Creek through Umstead Park rather than along I-40. We assume this error will be corrected in the Wake Wastewater Facilities Plan.

5. Reference page 38: The Walnut Creek wastewater treatment plant is no longer causing considerable water quality degradation in Walnut Creek as the effluent is now being piped to the vicinity of the confluence of Walnut Creek and Neuse River.

III. Alternatives

1. Reference page 75: Should the Wake County Complex 201 Facilities Plan indicate that, should wastewater from Apex be transported via the Walnut Creek interceptor to Raleigh Neuse River wastewater treatment plant for treatment, then there will be a further increase in the load on the interceptor.

2. General Comment: The discussion of alternatives is somewhat less than comprehensive. The information provided on effects of the stated alternatives is scanty. For instance, on page 80 it is stated that the "Pump to New Hope Basin Alternative," results in significantly higher costs and has no particular environmental advantages. Sufficient information should be presented so that the reader can determine whether this statement is valid.

   In addition, we recommend that an alternative that reflects a solution with broader scope (than those alternatives presented) be developed and evaluated. Such an alternative could combine some of the following elements:

   a)Upgrading of existing treatment facilities servicing the subject area(this alternative partially discussed for Cary Treatment Plant only).

   b)Use of package treatment plants in selected areas where they may be practical.

   c)Land use guidance and facilities phasing (land use guidance regulations might be enacted to phase and restrict growth to acceptable levels in the Upper Crabtree Basin and extend the date when additional interceptors will be required.

   d)Construction of a pumping station and force main to transfer wastewater from the 500 residents on the Coles Branch Treatment Plant to an existing Walnut Creek interceptor.

IV. Impact of the Proposed Project

1. Reference page 88, first paragraph: We suggest the following sentences be included. "Due to the extreme hazard of pine bark beetles in the project area at the present time, special care should be taken during the construction phase. All seriously damaged trees, especially pines, should be removed as injuries often increase beetle susceptibility."
2. Reference page 88, line 14, and page 93, line 3: The EIS should clearly state how the right-of-way will be maintained. If chemical control is planned, the chemical name, rate and frequency of treatment planned should be given.
3. Reference pages 112 and 113: Order of the two pages should be reversed.

V. Adverse Impacts Which Cannot Be Avoided and Mitigation Measures

1. Reference page 126, line 18: We suggest that material not wanted by landowners and too large to be chipped be made available to the public as free firewood.
2. Reference page 133: The completed "vegetative survey" should include present land use of the proposed right-of-way and acres in each use.

General

In the course of reviewing this EIS, our staff expressed substantial concern regarding the implications of the potential secondary impacts of growth and development that will be the obligate result of construction of this sewer line. The following comments indicate the nature of our concern:

"The proposition that . . . The proposed project promotes good planning and land use objectives must be questioned in light of its probable impacts on land use patterns and public service costs. In a recent study of sewer construction programs, CEQ concluded that these programs may 'have an adverse impact on energy conservation and land use and may, by encouraging urban sprawl, increase water pollution problems.' The report, prepared by Urban Systems Research and Engineering, Inc., Cambridge, Massachusetts, reviewed 52 wastewater treatment projects in urban fringed areas. The study found that when sewerage interceptor facilities are built so as to service potential growth far into the future, the over-capacity appears to encourage adverse development patterns. These projects encourage development to be strung out and to leapfrog over vacant land. A related study, *The Cost of Sprawl*, released by CEQ, HUD and EPA concludes that 'planning, to some extent, but higher densities to a much greater extent, result in lower economic cost, environmental cost, natural resource consumption and some personal cost for a given number of dwelling units.' The study also indicates that the higher density community requires about 44% less capital investment; requires a lower proportion of government investment; requires about 55% lower construction cost; generates about 45% less air pollution; and uses about 44% less energy and about 35% less water. While the above figures are not directly applicable to the Crabtree Creek project, they do raise serious questions about the planning philosophy outlined in this report and they do illustrate the importance of addressing the cost of urban sprawl in the impact statement.

"To say that 'the placement of the proposed interceptor will also facilitate implementation of good planning and land use objectives' ignores the fact that current funding mechanisms for interceptor sewers stimulate development, with communities fostering growth of any kind under pressure to amortize their public investments. Additionally, the local cost is generally paid from property or sales taxes. These taxes are regressive--meaning that lower income people pay a higher portion of their income in these taxes than do higher income people. This increased burden may make it impossible for other programs (i.e., housing and economic development) to achieve their objectives. The impact statement should discuss the allocation of the burden among various income groups, equitable ways of financing this program and impacts on other community objectives.

"Finally, according to the impact statement (p.55), the SCS flood control program for the area has encouraged speculation. Will this project encourage additional speculation? What will this do to the land use pattern? Prime agricultural land? What measures might be taken to avoid these problems? What about allocating the local cost to benefiting property owners and project phasing?"

Staff comments on this subject conclude by recommending that final approval of the project by EPA be conditioned on completion of appropriate land use, 201 and 208 plans by Wake County and their approval by the state and federal governments and on acquisition of land rights for SCS flood control dams by Wake County. EPA has included the last restraint (that relating to the flood control dams) as a provision of funding for the project and we concur with this step.

This still leaves open the question of any conditioning of this project on completion of the county land use and facilities planning efforts. At present, there is no doubt that Wake County lacks the appropriate full array of land management tools necessary to prevent (or minimize) adverse secondary impacts from this project. In this regard, Wake County is no different from all other North Carolina counties. The county has recognized this problem and its *Plan of Action to Manage Land Uses and Public Facilities within the Upper Crabtree Creek Watershed* represents its response to the issue. It appears to us that, if Wake County and Raleigh proceed with the key planning elements of this action plan, then a major step will have been taken to assure that the potential undesirable impacts of the development of the upper basin will be minimized. We suggest that, in order to assure that this vital phasing come to pass, EPA further condition approvals for this grant on the successful completion of the Action Plan by Wake County and Raleigh. In this regard, a phasing of the Crabtree Creek interceptor project may be appropriate. For example, the Richlands Creek branch, designed to serve overloaded state facilities and private interests near the Fairgrounds, could be built first after completion of the planning elements relating to that area. The EIS seems to suggest this approach on page 138 (paragraph at top of page) but includes only flood control structures as conditions. In this regard, we wish to point out that land rights to Structure 25 are not really vital to protecting the lower Crabtree basin from development upstream on Richlands Creek. Structure 11 is the key. We suggest the inclusion of Structure 25 in this condition be deleted. We suggest that this concept be broadened to include appropriate land use, 201 and 208 facilities planning. Such conditioning, it seems to us, will permit needed service to be extended into presently overloaded areas and will assure that the undesirable secondary effects from the project will be minimized. It would also provide interested parties with more information needed to evaluate the proposed project by clearing up certain questions that cannot now be answered except by speculation.

Although some undesirable growth and development might take place prior to completion of the above items and construction of the sewer project, it would appear that such activities could be minimized by strict enforcement of minimum lot sizes and effluent discharge requirements pursuant to PL92-500.

Sincerely yours,

Arthur W. Cooper

Arthur W. Cooper

AWC:cj
cc Thayer Broill
John Wray
Berry Williams
Alan Eakes
Page Benton
John Scott

NER North Carolina Department of
Natural & Economic Resources

JAMES E. HOLSHOUSER, JR., GOVERNOR • GEORGE W. LITTLE, SECRETARY

ARTHUR W. COOPER
ASSISTANT SECRETARY

BOX 27687, RALEIGH 27611
TELEPHONE 919 829-4984

March 4, 1976

Mr. John E. Hagan, III
Chief, EIS Branch
Environmental Protection Agency
1421 Peachtree Street, N. E.
Atlanta, Georgia 30309

Dear Mr. Hagan:

The following comments will summarize DNER's response to questions arising as a result of our review of the draft EIS for "Crabtree Creek, Wake County, North Carolina, EPA #370344." These comments were developed after several meetings between our respective staffs and as a result of your response of February 5, 1976, to my informal communication to you of December 2, 1975.

Title

We assume that our suggested title "Interceptor Sewer to Service the Upper Crabtree Creek Watershed, Wake County, North Carolina" is acceptable to EPA and will be used.

I. General Descriptive Information

1. We asked that consideration be given to moving the location of the forced main line proposed for the north side of I-40 between Umstead Park and I-40 from the north side of I-40 to the south side. The consulting engineers for this project have agreed to move the pumping station and the force main to the south side of I-40. The force main as now planned will cross I-40 at Trenton Road and tie into the gravity line as originally proposed. A copy of the consulting engineers letter on this subject is attached. Your February 5, 1976, letter indicates that you concur with this proposal.

2. We have examined the methodology used to develop the population projections described in the DEIS and have compared them to OBERS figures. The population projections used in the DEIS were derived from the "Report on Wake County Water and Wastewater Engineering Study." According to that Study:

> "These population projections have been based on field observations, development plans now under consideration within the county, other pertinent information available in published reports and on the best judgment of the Engineers."[1]

The projections for the Upper Crabtree Creek Watershed (see Table 5, page 48, DEIS) compare very favorably with projections based on OBERS Series "E" and are in fact slightly less than OBERS based projections (see Table 5 below)

TABLE 5

UPPER CRABTREE CREEK WATERSHED POPULATION PROJECTIONS

	1960 (census)	1970 (census)	1980 (proj.)	1990 (proj.)	2000 (proj.)
Wake County Portion	6,316	15,499	23,306*	32,204*	42,064*
Durham County Portion	853	928	1,042*	1,138*	1,204*
TOTAL	7,169	16,377	26,348* (24,596**)	33,352* (31,283**)	43,267*

Therefore, the data contained in Table 5 in the original version of the DEIS are satisfactory. However, we suggest use of the revised Table 5 provided above so that the close agreement with OBERS Series "E" projections can be demonstrated.

3. The questions we raised regarding water use figures and derivation of the 5,000,000 gpd design figure have been answered and we accept the data in this table.

4. EPA has agreed to remove from Figure 8 the interceptor shown following Crabtree Creek through Umstead Park.

5. EPA agrees that the Walnut Creek wastewater treatment facility is no longer causing water quality degradation in Walnut Creek and will correct the final EIS to reflect this fact.

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[1] p.6 "Report on Wake County Water and Wastewater Engineering Study": Volume 1, Wake Engineering Study Group, Cary, N. C. 1969

* Disaggregation from OBERS Series "E" County Population Projections (1975 draft revision)

** Wake Engineer Study Group Projections

III. Alternatives

1. We understand that EPA is expanding the cost analysis of the Walnut Creek alternative.

2. Our staff and EPA discussed the question of treatment of alternatives to the proposed project at considerable length. We are now satisfied that the alternatives discussed in the draft EIS are satisfactory and represent those that are the most feasible under the circumstances. The discussions with EPA clarified a number of the questions our informal reviewers had raised and it is on this basis that we find the treatment in the EIS satisfactory.

IV. Impact of the Proposed Project

1. EPA has agreed to this sentence and will include it in the final EIS.

2. DNER has discussed the matter of ROW maintenance with the Director of Utilities for the City of Raleigh (p. 88 and 93, DEIS). The interceptor right-of-way will be maintained by the Utilities Department of the City of Raleigh. The city will conduct an initial seeding with grass over the right-of-way. No herbicides will be utilized to control vegetation on the right-of-way. The city does not anticipate further maintenance since upkeep will be the responsibility of the individual property owners.

3. The page order will be changed in the EIS.

V. Adverse Impacts Which Cannot be Avoided and Mitigation Measures

1. EPA agrees that our suggestion is, in principle, fine except for the fact that there are procedural problems associated with giving the wood away and that there may be adverse air pollution impacts from burning it. It is our understanding that the contractor who clears the ROW is free to discard the wood in any way he wishes. We suggest that the contractor be encouraged to put the wood that cannot be chipped to some useful purpose rather than burning it on the job.

2. The following information summarizes present land use and acreages devoted to each in the proposed ROW:

> Existing land use on the proposed Crabtree Creek Interceptor right-of-way is predominately undeveloped. A rough land-use inventory of the right-of-way has been made from existing data, principally the "Research Triangle Regional Development Guide."[2] Use of the State Land Classification System is made for categorization nomenclature of land uses. This system identifies the following categories: developed, transitional, community, rural and conservation. Explanatory sub-categorizations are made as needed.

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[2] "Research Triangle Regional Development Guide"; Research Triangle Regional Planning Commission; Research Triangle, NC; April, 1969

Referencing the map "Crabtree Creek Interceptor Sewer" (page 5 of the DEIS) and beginning at the northeastern point of the interceptor off Oak Park Road and then proceeding south, then east, and finally west, existing land use patterns on the interceptor right-of-way may be noted as follows:

From the old Oak Park Treatment Plant off Oak Park Road on the north edge of Crabtree Creek following a westerly course to the Duraleigh Road Bridge is roughly 3,500 linear feet (3.2 acres[3]) of community (primarily residential) usage;

From the Duraleigh Road Bridge westward to the confluence of Crabtree and Richland Creeks, southward along Richland Creek to the splitting of the interceptor below Reedy Creek Road is approximately 13,300 linear feet (12.2 acres) of rural (predominately agricultural) usage;

From the split below Reedy Creek Road southward to the division above I-40 and traveling eastward toward the National Guard Armory is roughly 11,900 linear feet (10.9 acres) of rural (predominately agricultural) usage;

From the division above I-40 traveling south and east to the Carter Stadium and State Fairground service areas is approximately 13,800 linear feet (12.7 acres) of rural (primarily agricultural) usage;

From the split below Reedy Creek Road traveling northwest along I-40 to the point that the interceptor crosses I-40 is about 19,000 linear feet (17.5 acres) of rural (predominately forestry) usage;

From the crossing at I-40 traveling in a southwest direction along Crabtree Creek to the split for the Mobile City interceptor is roughly 11,900 linear feet (10.9 acres) of rural (mixed forestry and agricultural) usage;

The Mobile City interceptor ROW is approximately 4,200 linear feet (3.9 acres) of predominately rural (mixed) usage;

From the split for the Mobile City interceptor traveling southwest along Crabtree Creek past Morrisville to Highway 54 is roughly 7,000 linear feet (6.4 acres) of transitional (suburban) usage;

From Highway 54 traveling southwest along Crabtree Creek to Coles Branch is about 6,300 linear feet (5.8 acres) of rural (primarily agricultural) usage;

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[3] Acreage is based on a standard 40 foot right-of-way; figures are not adjusted for any deviations occurring in residential areas.

The Coles Branch interceptor from the confluence of Crabtree Creek and Coles Branch southeastward to the end of the interceptor is approximately 14,000 linear feet (12.9 acres) of rural (predominately agricultural) usage.

The following table summarizes, by acres and percent of total usage, the existing land uses on the ROW. We suggest its inclusion in the EIS.

SUMMARY OF EXISTING LAND USES
ON THE
CRABTREE CREEK INTERCEPTOR RIGHT-OF-WAY

Category	Acres	Percent of Total Usage	Sub-Category Acres	Percent of Total Usage
Rural	86.8	90%		
			Forestry 17.5	18%
			Agricultural 54.5	57%
			Mixed 14.8	15%
Community	3.2	3%		
			Residential 3.2	3%
Transitional	6.4	7%		
			Suburban 6.4	7%
Total	96.4	100%	96.4	100%

General Discussion

The following information has been provided by our staff to speak to the questions raised concerning the impacts to community facilities and local tax rates caused by growth induced by the project. Although general in nature, they should suffice for purposes of demonstrating, in the EIS, the magnitude of such affects and we suggest the inclusion of this material in the EIS.

1. Population Growth

Any effort to estimate the costs of growth must be based on population increases induced by the facility in question. Five separate calculations of induced growth are possible based on the data in the EIS:

a. Wake County Planning Department projection through 1990 - Upper Crabtree Creek Watershed 31,283.

b. DEIS p. 121 - projected density for this project is 7.4 persons per acre. (7.4 x 16,500 acres = 122,100)

c. Upper Crabtree Creek Area Wastewater Needs Wake County, N. C. by Wake Engineering Study Group.

Wastewater flows in the Upper Crabtree Creek were based on present and projected land use in the various sub-basins. The following design criteria were used for projecting future waste generation:

Waste Generation Design Criteria

Industrial	-	10,000 gal/acre/day
Commercial	-	4,500 gal/acre/day
Residential	-	2,000 gal/acre/day
Park	-	1,000 gal/acre/day

(2,000 gpd/acre ÷ 80 gpcd = 25 persons per acre x 15,400 acres = 412,500 persons in Upper Crabtree Creek Basin.)

d. DEIS PP. 98 and 116 indicate population will be 80,000.

e. Map No. 2 shows the Estimated Future Peak Flow to be 49.1 mgd.

49.1 mgd ÷ 80 gpcd = 613,800 population equivalent - 35,000 state owned land population = 578,300 population equivalent (private).

Estimates (b) and (c) are used in subsequent analyses as estimates of high and low populations to be expected in the Upper Crabtree Creek basin.

2. Determination of the amount of growth induced by the proposed interceptor sewer.

To determine the amount of growth induced by the proposed interceptor sewer, it is necessary to calculate the practical holding capacity (population) of the Upper Crabtree Creek basin with sewer service and subtract from this figure the practical holding capacity without sewer.

There are approximately 30,000 gross acres of developable land in the Upper Crabtree Creek basin. Based on land uses in other North Carolina cities, it is estimated that these 30,000 acres will be developed as follows: residential 16,500 acres (55 percent), transportation 7,500 acres (25 percent), commercial 3,000 acres (10 percent), industrial 1,500 acres (5 percent), and public/institutional 1,500 acres (5 percent). Based on information supplied by the Wake County sanitarian, minimum lot sizes in western Wake County average 60,000 square feet due to soils generally unsuitable for development with septic tanks. Based on this average minimum lot size and a population of three persons per household, the study area could accommodate a population of approximately 33,000 in 11,000 dwelling units on 16,500 net acres of residential land without the sewer facility.

Determining maximum population in the study area with sewer available could be based upon any of the estimates in (1) above. Estimate (c), 412,500 persons is chosen as an upper limit. Estimate (b), rounded to 7 persons per acre, yields a population of 115,500 persons (7 x 16,500 acres) and is utilized as a lower estimate. Cost of providing services for the future population is given in (3) below for both these target populations, less the 33,000 persons (11,000 dwelling units) who could live in the study area without the proposed sewer system.

3. Determination of costs of providing municipal-type services for the induced population.

The table below gives estimated costs for providing municipal-type services for the study area population induced by the proposed sewer system. High and low estimates are given for induced populations of 379,500 and 82,500, respectively. Costs per capita were derived from City of Raleigh costs in FY 1975-76 for all categories, except libraries, which reflect Wake County per capita costs in 1975-76.

SERVICE COSTS

Service	Cost/Capita	Cost for 82,500 pop.	Cost for 379,500 pop.
Fire protection	$ 25.75	$ 2,124,375	$ 9,772,125
Police protection	40.17	3,314,025	15,244,515
Solid waste	21.75	1,794,375	8,254,125
Library	1.94	160,050	736,230
Parks and recreation	22.16	1,828,200	8,409,720
Streets	9.17	756,525	3,480,015
Administration	19.82	1,635,150	7,521,690
TOTAL	$140.76	$11,612,700	$53,418,420

4. Analysis of benefits versus costs of induced population growth.

For purposes of this analysis, it is assumed that revenues generated by tax base from induced development would be adequate to pay for the urban-type services needed by the induced population. However, it must be realized that the above costs do not include capital expenditures for municipal infrastructure.

particularly streets, water and sewer. According to estimates provided by the planning departments in the City of Raleigh, City of Durham and the Town of Cary, these municipalities already have in place most community facilities needed to serve an additional 223,000 people without adding additional sewer lines. Obviously added costs would be incurred by each of these cities if they had to serve this many more people, but the costs should be substantially lower than providing these services in the hinterlands of Wake County. This is particularly true of capital expenditures for facilities such as fire stations, libraries, and parks which have a "service area radius" as well as a maximum population each can serve. Based on this brief analysis, future growth in Wake County would probably be less costly, in terms of required public expenditures, if vacant property already served by public utilities and facilities were "in-filled" before intensive development outside this area is induced by public expenditures for sewer facilities.

I trust that these responses are satisfactory and that it will now be possible for you to complete the EIS prior to your March 15, 1976 deadline.

Sincerely yours,

Arthur W. Cooper

AWC:eh

cc: Sandy Beach
Everett Knight
Thayer Broili

APPENDIX 18

STATUS OF FLOOD CONTROL PROJECTS

COUNTY OF WAKE
RALEIGH, NORTH CAROLINA

November 28, 1975

Mr. Robert D. Howard, Chief
Environmental Impact Statement Preparation Branch
Environmental Protection Agency
1421 Peachtree Street
Atlanta, Georgia 30309

Reproduced from best available copy.

Re: EPA Project C 370344 Crabtree
Creek, Wake County, North Carolina

Dear Mr. Howard:

We are most interested in finalizing the EPA grant offer of $2,445,750 for the captioned project.

In your draft Environmental Impact Statement of January, 1975 you recognize on page 137 that "Completion of this flood control project is one method whereby the threat of increased flooding may be eliminated." Wake County is totally committed to the completion of the Crabtree Creek Watershed Project as evidenced by our tabulated accomplishments which are enclosed as an attachment to this letter.

You further state in the draft EIS that "Grant funds shall be withheld from the proposed project until land rights have been acquired for the Soil Conservation Service control structures located downstream of each respective service area, or until other measures are taken, including but not limited to channelization, urban runoff controls, developmental restrictions, and other landuse modifications which will insure adequate flood control . . . . ." We respectfully submit that instigation of sediment control programs and flood plain zoning by both Wake County and the City of Raleigh are substantial measures currently established to alleviate the flooding problem and by their nature constitute "other measures".

It is our understanding that the land acquisition requirements imposed upon Wake County prior to January 1, 1976 are limited to Structure 11A. This structure includes eleven parcels of land. Eight of these parcels have been fully and totally acquired as evidenced by the attached list.

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DEC 3 1975
WAKE COUNTY
COORDINATOR

The three remaining parcels (described on a second list) can be summarized as follows: Morton Property - The owner died recently and the estate is being handled by the Trust Department of Wachovia Bank and Trust Company. Negotiations are virtually complete and should be closed well before December 31, 1975. Valone Property - Condemnation action has been instituted, appraisers have been appointed by the Clerk of Court, the appraisers are to be briefed on December 3, 1975 and are to report their findings on December 13, 1975 to the Clerk of Court. At that point Wake County can and fully intends to take possession of the land. Walton Property - Condemnation proceedings have been instituted against the Walton property. County attorneys are diligently seeking to schedule a preliminary hearing before the Clerk of Court with Walton's attorneys to confirm a hearing date. Walton's attorneys are apparently seeking to delay proceedings.

As you are aware Dr. Walton entered suit in Eastern District Court of North Carolina some months ago seeking a preliminary injunction to halt county and federal action in the Crabtree Creek Watershed Project. Wake County successfully defended the suit and Judge Dupree has denied the request. It is speculated that Dr. Walton will appeal Judge Dupree's ruling, but as of this date no appeal has been entered.

In essence, Wake County has taken every available legal step to acquire the Walton property. There appears to be no doubt that the county will be able to acquire the property through the exercise of the power of eminent domain. However, the wheels of justice do turn slowly.

In view of Wake County's demonstrated accomplishments on Crabtree Creek Watershed Project, and in consideration of the eminent acquisition of all land rights for Site 11A except for the Walton property, and in further consideration of the extraordinary efforts by Wake County to acquire the Walton property, we do respectfully and sincerely request that the Environmental Protection Agency authorize the disbursal of the grant funds for the appropriate segments of the Crabtree Creek sewer outfall associated with Structure 11A.

In absence of approval we would further request that an extension of time be granted until July 1, 1976 to conclude the Walton condemnation before any consideration is given by EPA to withdrawal of the grant funds.

We will be pleased to meet with you and your associates at a mutually agreeable time during the month of December to discuss this matter further.

Sincerely,

Vassar P. Shearon
Chairman

VS/dc

Enclosure

Accomplishments on the Crabtree Creek
Watershed Project
Since July 1, 1974

Site Analysis

Site 1

A construction contract in the amount of $225,524.50 was awarded on September 19, 1974 and is scheduled to be completed in December 1975.

The local cost for land rights previously expended totaled $18,018.

Site 2

A vegetative maintenance contract in the amount of $389 was awarded and work was completed on November 17, 1975.

Site 3

A vegetative maintenance contract in the amount of $517 was awarded and the work was completed on November 17, 1975

Site 5A

A property survey contract in the amount of $31,028 was awarded on April 21, 1975 and work was completed on October 3, 1985.

One tract of land totaling 10.568 acres of land was purchased for $23,150.

(The easements on five parcels of land totaling approximately 22 acres were acquired prior to July 1, 1974).

Condemnation actions have been filed in court on one tract totaling 17.858 acres.

Authority was sought and obtained from the State Soil and Water Conservation Commission to institute condemnation on two additional tracts of land totaling 50.1 acres.

Site 11A

An engineering contract was negotiated and executed between the County of Wake and the State Department of Transportation for a $10,000 engineering design for elevation of a road crossing Site 11. It is estimated that the total cost of the road, most of which must be born by Wake County will total $270,000.

A property survey contract in the amount $7,728.90 was awarded on April 7, 1975 and completed on June 17, 1975.

Eight parcels of land have been obtained to include six parcles by easement totaling 71.645 acres and two parcels by purchase totaling 9.303 acres at a total cost of $27,558.

(Two of the easements obtained involved seeking and obtaining approval of the easements by the Council of State and obtaining signatures of the Governor and the Secretary of State on the easements granted).

Condemnation proceedings have been instigated for two parcels of land totaling approximately 34 acres of land.

Site 13

A construction contract in the sum of $465,959.57 was completed on June 5, 1975.

Three repair contracts for Site 13 have been awarded and completed since June 5, 1975 and total $5,362 in cost.

(Land rights cost for Site 13, expended prior to July 1, 1974 total approximately one-half million dollars)

A contract has been negotiated and executed between the County of Wake and the City of Raleigh for utilization of Site 13 for recreational purposes by the City of Raleigh.

Site 18

Two vegetative maintenance contracts have been awarded and completed at a total cost of $814. The contracts were completed in April and November, 1975.

A maintenance contract in the amount of $16,802 was awarded on November 8, 1974 and completed on September 9, 1975.

Site 22B

A construction contract in the amount of $228,984 was awarded on September 19, 1975. Construction is scheduled to be completed in December 1975.

Site 23

A property survey contract in the amount of $39,821.35 was awarded on September 16, 1974 and completed on March 28, 1975.

Eleven tracts of land have been acquired. Six tracts by easement totaling 3.799 acres, four tracts by deed totaling 234.826 acres and one tract by contract totaling 267.707 acres have been acquired at a total expenditure of $533,976.

Project Wide

Wake County has expended approximately $9,000 since July 1, 1974 for property appraisals, legal services, and miscellaneous survey connected with the project.

Wake County applied to the Farmer's Home Administration for a watershed loan in the amount of 1 1/2 million dollars and the application was approved in June of 1975.

The Wake County Soil Erosion and Sedimentation Control Program became operational on March 1, 1975. Since that time five incorporated municipalities within the county have, by resolution, come under operational control of the county's Soil Erosion and Sedimentation Control Program. Field accomplishments on both pre-existing sites and for new construction have materially contributed to abatement of the sedimentation problem thereby contributing to alleviation of flooding problems.

The City of Raleigh and the City of Cary both operate sediment control programs within their respective jurisdictions.

Wake County has applied to the Federal Insurance Administration for coverage by their program, and a contract has been awarded by FIA to the Corp of Engineers to conduct a flood plain study within the county.

Flood hazard regulations for the County of Wake became operational on October 1, 1975 thereby adding further to the alleviation of the flood hazard within the county.

The City of Raleigh also operates a flood plain zoning ordinance.

Wake County
Department of Natural Resources

Room 610 — Wake County Courthouse • P. O. Box 1226 • Raleigh, North Carolina 27602

H. A. "JACK" SMITH
DIRECTOR

Telephone (919) 755-6838

January 28, 1976

Mr. Jack E. Ravan
Regional Administrator
Region IV
Environmental Protection Agency
1421 Peachtree Street N. E.
Atlanta, Georgia 30309

Attention: Water Division

Re: C370344
Crabtree Creek, Wake County, NC

Dear Mr. Ravan:

In accordance with your letter of December 19, 1975 to Mr. Vassar P. Shearon granting an extension of time on the captioned project, we are pleased to submit a monthly project report.

All property for dam site 11 has been acquired except for the property owned by Dr. Russell C. Walton, Jr. Dr. Walton has entered a suit in Eastern District Court for North Carolina seeking an injunction against the Crabtree Creek Watershed Project. The suit was denied, and is now on appeal to the Fourth Circuit Court of Appeals in Richmond, Virginia. Our attorney has received a time schedule from the Court of Appeals which includes a February 18, 1976 deadline for Dr. Walton to perfect his appeal, a 30 day subsequent period for Wake County and the U. S. Government to answer his complaint, and an established date in May for oral arguments before the Court of Appeals.

In the meantime, Wake County is vigorously pursuing condemnation action against Dr. Walton in the state courts.

Negotiations have been completed to acquire a key tract of land on dam site 23, which constitutes one half of the actual dam site. The other half has already been procured.

Negotiations continue with landowners on site 5A. Two tracts are in the process of being condemned.

A surveying contract for site 20 has been drawn and will be advertised for bids shortly.

Winter shut-down is in effect on the two construction sites--sites 22B and 1. Both are virtually complete except for final seeding etc.

We will be pleased to answer any questions which may arise concerning the project.

Sincerely,

H.A. Smith

H. A. Smith

HS/dc

cc: Vassar Shearon
G. H. Jones
B. G. Brock
James Mills

Wake County
Department of Natural Resources

Room 610 — Wake County Courthouse • P. O. Box 1226 • Raleigh, North Carolina 27602

H. A. "JACK" SMITH
DIRECTOR

Telephone (919) 755-6838

March 2, 1976

Mr. Jack E. Ravan
Regional Administrator
Region IV
Environmental Protection Agency
1421 Peachtree Street N. E.
Atlanta, Georgia 30309

Attention: Water Division

Re: C370344
Crabtree Creek, Wake County, NC

Dear Mr. Ravan:

We are pleased to submit our monthly report on the captioned project:

1. Wake County continues to pursue condemnation of the Walton Property on Site 11A in the State courts. No definitive accomplishments can be reported at this time.

2. Negotiations have been completed to acquire a minor tract on Site 5A consisting of .002 acres; the deed will be recorded shortly.

3. A deed has beendrawn and executed by the Wake County Commissioners to transfer four small parcels of property on Site 22B in accordance with an earlier "consent judgement".

4. Estimates have been received for surveying Site 20; upon review and approval by the Board of Commissioners, the contract will be awarded.

5. Vigorous negotiations have been underway with virtually all property owners on Site 5A. Seven parcels will be submitted on March 10, 1976 to the State Soil and Water Conservation Commission for approval of condemnation. Upon receipt of approval, which normally takes no more than 7 days, condemnation proceedings will be initiated.

Negotiations on four other parcels are nearing conclusion, and should be consummated in March.

All other parcels will be vigorously pursued.

6. Globe Industries (owner of a sizeable needed acreage on Site 20, including buildings considered subject to relocation) has declared bankruptcy. Wake County has contacted the referee in bankruptcy, has ordered an appraisal of the subject property, and is developing plans to acquire the needed property.

7. Winter shutdown remains in effect on Sites 22B and 1.

8. Appended hereto are current status reports, by landowners, for Sites 11A, 23, and 5A on land rights, plus a recapitulation for the entire project.

We remain available to answer any questions which you may have.

Sincerely,

H. A. Smith

H. A. Smith
Director

jls

Enclosures

cc.
Vassar Shearon
G. H. Jones
James W. Mills
B. G. Brock

LAND RIGHTS
CRABTREE CREEK WATERSHED PROJECT
Site 11A

Acquired

Date	Grantor	Grantee	Type of Instrument	Recorded		Acres	Price	Remarks
				Book	Page			
6-17-75	Earnie G. Stone	County of Wake	Easement	2325	373-394	0.147	0	11A-6 Flood Pool
6-18-75	S. R. Turner, Jr.	County of Wake	Easement	2325	367-368	0.289	0	11A-2 Flood Pool
6-23-75	Lucille A. Grissom	County of Wake	Easement	2325	369-370	0.771	9,558.00	11A-3
6-30-75	Frank M. Harper	County of Wake	Deed	2327	142	4.779	0	11A-4 2.748 Perm Pool 2.031 Flood Pool
10-3-75	Lillie Mae Grissom	County of Wake	Easement	2350	403.405	2.438	18,000.00	11A-5 Flood Pool
10-3-75	Lillie Mae Grissom	County of Wake	Deed	2350	401-402	4.524	0	11A-5 Perm Pool
10-7-75	State of NC (Dept of Corrections)	County of Wake	Easement	2350	559-562	13.±	0	
10-7-75	State of NC (NCSU)	County of Wake	Easement	2350	563-567	55.±	0	

LAND RIGHTS
CRABTREE CREEK WATERSHED PROJECT
Site 11A

NEEDED

Date	Grantor	Grantee	Type of Instrument	Recorded		Acres	Price	Remarks
				Book	Page			
	John G. Morton					1.546 .449		Flood pool 11A-1 Work limits
	James A. Valone					1.866 5.526		Perm Pool 11A-7 Flood pool
	Russell C. Walton, Jr.					13.059 7.733 6.997		Perm Pool 11A-6 Flood Pool Work limits

*U.S. GOVERNMENT PRINTING OFFICE: 1976-649-074